MODERN
Machine Shop

PUTNAM POSTIV-LOK END MILLS

Three Reasons Why

1 Reduce set-up and change-over time required on large tapered shank tools.

2 Versatility—drilling, reaming and other operations can be done with same set-up, using Postiv-Lok adapters.

3 Eliminate need of integral tapered shanks. Tools cost less.

Write on your letterhead for new catalog.

PUTNAM

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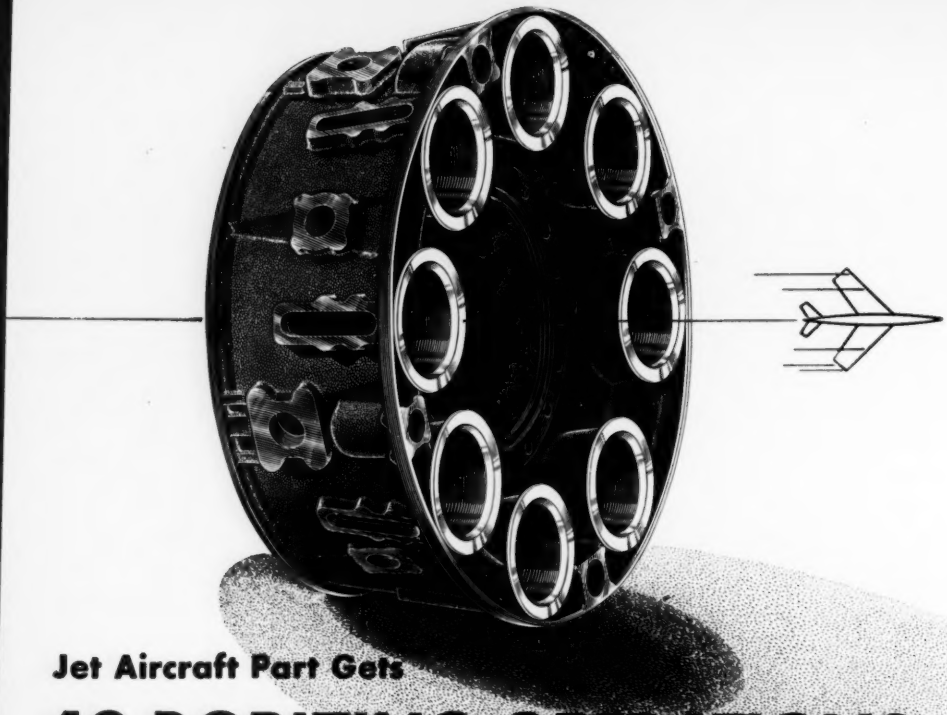
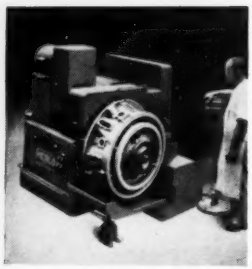
MODERN MACHINE SHOP — 1953 — 4THLY



Jet Aircraft Part Gets

40 BORIZING OPERATIONS

in 12 minutes



MAKING DIFFICULT jobs easy is a Heald specialty. Here's a typical example.

Eight circular flanges on this jet-engine compressor frame require *five* individual borizing operations to very close tolerances. Yet with the Heald way-type Bore-Matic shown at the left, the entire job—including loading and unloading—takes only 12 minutes per part.

The number 3 size way leg unit, with rotary fixture mounted low on the base, simplifies loading of the heavy, awkward part. The rotary fixture is manually indexed and positioned by an air-operated locator pin with foot-valve control. Operations performed include chamfering, turning, facing, forming and blending two radii. Borizing operations at each of the eight positions are completely automatic.

Remember, when it comes to precision finishing, it pays to come to Heald.

Internal and Rotary Surface Grinding Machines and Bore-Matics

HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 26 NUMBER 2
JULY, 1953

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Published monthly and copyrighted (1953) by

Gardner Publications, Inc.
431 Main St., Cincinnati 2, Ohio

Printed in U. S. A.

Acceptance under Section 34.64. P. L. & R., Authorized

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MODERN Machine Shop

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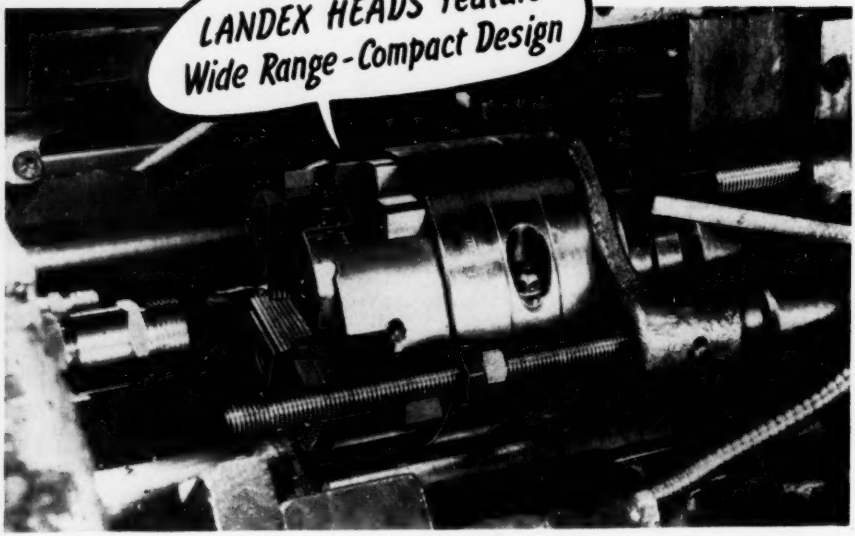
FOR EXTERNAL THREADING BY AUTOMATICS



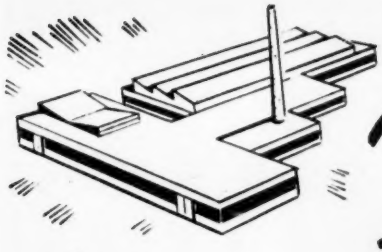
A 1¼" JX LANDEX Head on a 1¾" Warner & Swasey Automatic is shown threading ¾" Press-Lock spuds. 1" Straight Pipe threads are cut on B-1113 steel, with an average of 3000 pieces threaded between chaser grinds. These spuds are one of the many types of industrial hose couplings and valves produced by the Dixon Valve and Coupling Company of Philadelphia.

The LANDEX is a yoke-operated head compactly designed for use on live-spindle machines where die head clearance is limited. They are built in ½", 13/16", 1¼", and 2" sizes, and each size will cut a wide range of thread diameters. For example, the 1¼" LANDEX shown will cut threads ¼" to 1¼" in diameter, and oversize chaser holders (available for all LANDEX JX Heads) will allow cutting thread diameters up to 2¾". Write for Bulletin F-90.

LANDIS Machine COMPANY
50TH ANNIVERSARY
WAYNESBORO, PENNA.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

370



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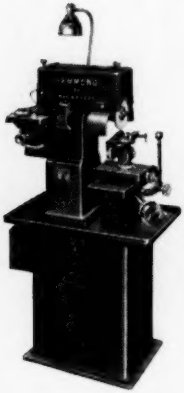
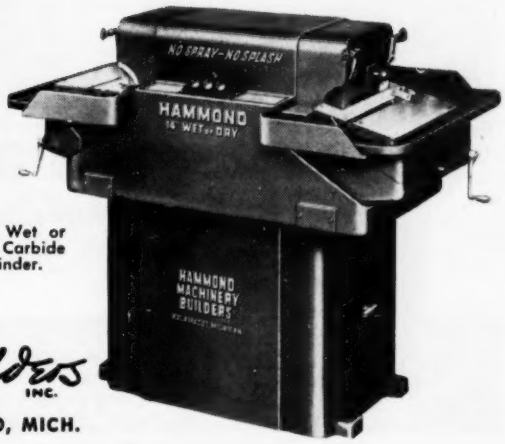


CB-77 Chip Breaker and Diamond Finishing Grinder.

SAVE TIME • TOOLS • WHEELS with America's "Choice" and most complete line of Carbide Tool, Chip Breaker and Diamond Finishing Grinders. *Over 6,000 in service.*

Clip this ad to your letterhead and Carbide Grinder Catalog No. 225 will be sent **by return mail.**

WD-10 Wet or Dry 10" Carbide Tool Grinder.



14-WD Wet or Dry 14" Carbide Tool Grinder.

Hammond Machinery Builders INC.

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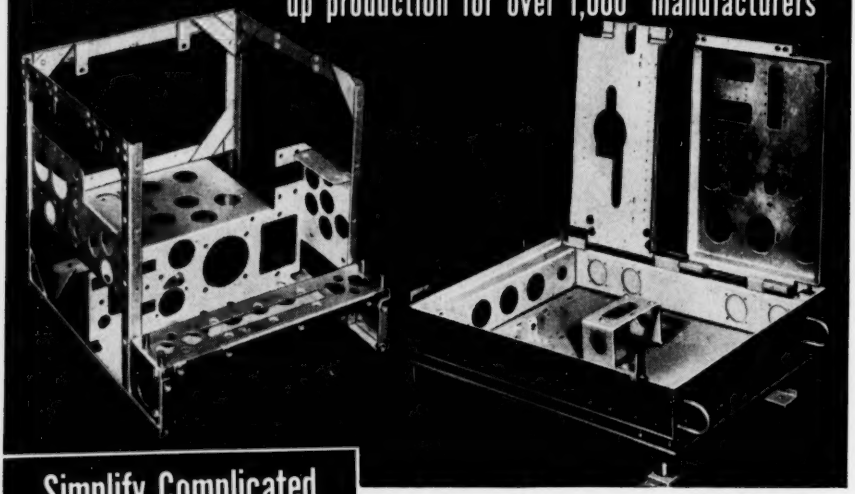
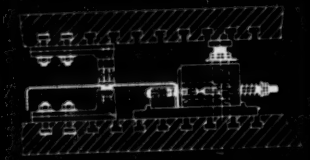
Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



Simplify Complicated Piercing Operations



Use this HU-50 90° Perforating Unit on the same job with other Whistler Dies . . . often saves extra press operations.

USE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals . . . fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press . . . without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

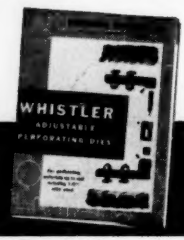
Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

S. B. WHISTLER & SONS, Inc.

740 Military Road

Buffalo 23, New York



For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs.

Booth 2024—National Metal Congress—Oct. 19 to 23—Cleveland

WHAT ARE YOU LOOKING FOR IN GEARS?

You get *all* of these in Farrel-Sykes gears—because they are all the product of precision generation, plus high-grade materials, plus the herringbone design.

Farrel-Sykes gears are made of the finest-grade materials available. They are generated by the famous Farrel-Sykes method—a process that assures accuracy of tooth spacing, profile and helix angle.

The herringbone design provides evenly distributed pressure over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly and thus shorten the life of the gears.

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Farrel-Sykes herringbone gears are made in any size from ¼" to 20'0" diameter, for any power capacity and speed.

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FB-841

TEXAS PLANT MACHINES UP TO 2,000 PARTS IN 8 HOURS with Atlas MILLER!

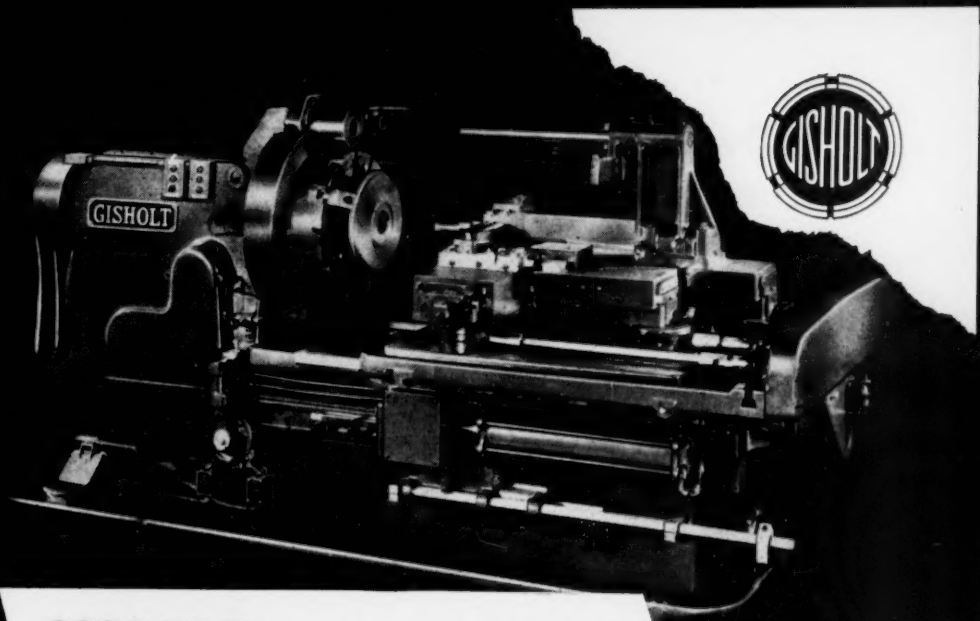
Making pendulous vanes for Gyro-horizons — the instrument that helps a pilot fly level when visibility is zero — is a job requiring extreme machining accuracy and care.

Roberts Engineering and Mfg. Co., Corpus Christi, Texas, finds an Atlas miller delivers the precision required. Machining 14 pieces at a time in one operation sequence, the Atlas produces 2,000 finished parts every 8 hours.

Atlas milling accuracy and versatility can solve small parts machining problems for you, too . . . and at low cost. This Timken-bearing equipped, V-belt driven miller provides a wide selection of speeds and feeds, adapts readily to automatic production devices. Write today for complete information.

ATLAS PRESS COMPANY
712 N. PITCHER ST. • KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

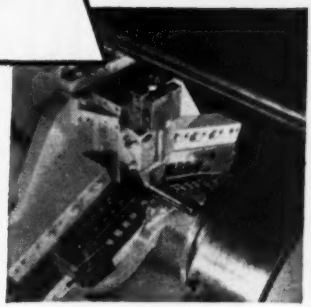


SIMPLE *is the word for the* SIMPLIMATIC!

Wherever you have a sufficient run of similar parts, the Simplimatic Automatic Lathe can solve several of your problems at once.

1. High speed production assures larger output at lower cost per piece.
2. The wide variety of tool arrangements on the large, flat table of the *Platen Type* Simplimatic (shown above) makes it adaptable to a wide range of work.
3. Training time is reduced to a minimum because the entire machining cycle is completely automatic. One operator normally runs several Simplimatics.

The extreme flexibility of the standard Simplimatic can frequently give you all the advantages of a machine designed especially for your job. If you want simple, quick, lower cost production, this is a good time to investigate the Gisholt Simplimatics. Ask for literature.



***The Radial Type* Simplimatic** is ideal for machining flywheels, etc., with wide faces and multiple inside and outside diameters. Extreme rigidity permits multiple tooling and maximum cutting speeds, sustained accuracy and excellent life of cutting tools.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Designed to meet your milling requirements...

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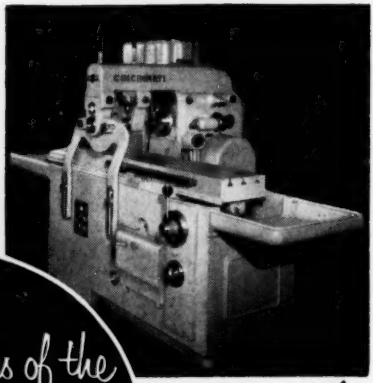
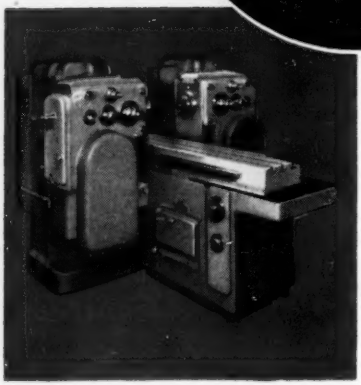


Three styles of the NEW CINCINNATI NO. 2-24 AUTOMATIC

Plain style. CINCINNATI No. 2-24 Automatic Milling Machine.

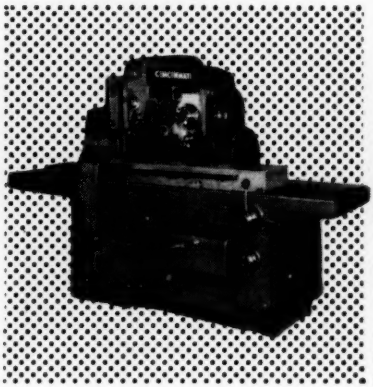


Duplex style, CINCINNATI No. 2-24 Automatic Milling Machine.

CINCIN

MILLING MACHINES • CUTTER SHARPENING MACHINES • METAL FORMING MACHINES OPTICAL PROJECTION PROFILE GRINDERS

the NEW Cincinnati No. 2-24 Automatic



Plain Rise and Fall style, CINCINNATI No. 2-24 Automatic Milling Machine.

These new Cincinnati Milling Machines combine advanced production features with easier, quicker, more convenient means of setting up the job. They are built in three styles: Plain, Duplex, and Plain Rise and Fall. All have . . .

Automatic Two-Way Table Feed Cycles for one-way milling; and for reciprocal milling with midway safety stop position.

Cycle Selector, a small cam-shaft unit which controls the sequence of events in the automatic cycle. It can be removed and replaced in less than a minute.

Automatic Backlash Eliminator—It automatically engages during feed stroke; releases during rapid traverse.

Automatic Spindle Stop—When the table stops for loading and unloading the fixture, the spindle stops rotating.

Single Control Lever—It starts the complete automatic cycle.

Power Manual Controls for table and spindle carrier; a labor-aiding convenience for setting up the machine. To top it off . . .

Dynapoise Overarm, a built-in feature that chokes self-excited chatter.

With new CINCINNATI No. 2-24 Automatics, metalworking shops everywhere can reduce the cost of milling operations, within 3 hp and 5 hp range, on a wide variety of parts manufactured in medium to infinite quantities. Brief data in Sweet's Machine Tool Catalog, or for complete information, write for new 28-page catalog, No. M-1760.

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FLAME HARDENING MACHINES
CUTTING FLUID

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

MORE JOBS
SHAPES
PROFITS
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on
SPECIAL FIXTURES
SET-UP CHANGES
WORK TIME

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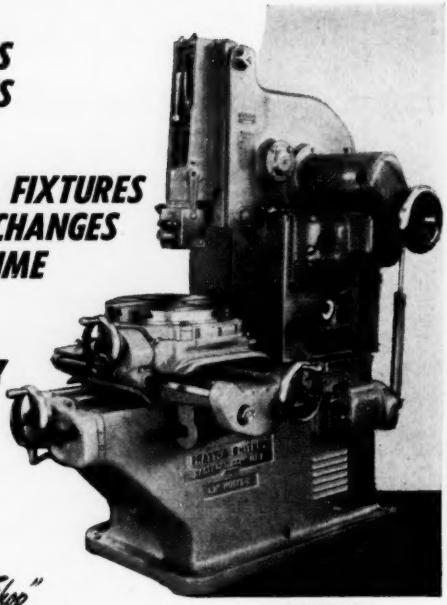
"The Handiest Machine in Your Shop"



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6" or 12" Ram Stroke

- PERMANENT ACCURACY
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- BETTER VISIBILITY
- POWER ROTARY FEED to the TABLE
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WHEREVER IRREGULAR SHAPES ARE HANDLED . . . . versatile Pratt & Whitney Vertical Shapers will machine your difficult jobs faster, more accurately and more profitably. Open construction permits handling a wide variety of pieces that cannot be machined conveniently or economically by any other method. Vertical design transfers cutting pressures directly to table and bed . . . eliminates springing . . . assures accuracy.

TAKE ADVANTAGE OF PERFORMANCE LIKE THIS . . . 35 different surfaces and slots machined without a single change of set-up!

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25 Charter Oak Blvd., West Hartford 1, Conn., U.S.A.

Please send my copy of the 16-page Vertical Shaper Circular No. 423-7.

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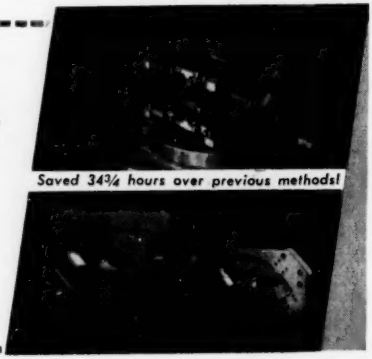

Saved 34¾ hours over previous methods!

Precision + Speed + Power

. . . THIS VERSATILE MACHINE CAN REPLACE 2 OR MORE SINGLE-PURPOSE MACHINES

KNIGHT'S **No. 50**

Vertical Milling & Precision Boring Machine

A single solid-base machine with every essential feature for milling and accurate boring—an extremely versatile machine that will do the work of 2 or more single-purpose machines.

Work transfers are entirely eliminated
Set-up time is reduced to a minimum

Table feeds 5/16" to 20" per minute plus rapid traverse in all directions. 16 Spindle speeds from 40 to 2000 r.p.m. and infinitely variable boring feeds from .0005" to .010".

Convenient quick-action controls—full-vision work areas—easy operation. Powerful all-gear 7½ H.P. drive—extra-rugged construction.

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West Pine, St. Louis 8, Mo.

Send catalog on No. 50 and other Knight Milling Machines.

NAME.....

TITLE.....

☐ Send information on Knight's 20" & 42" Rotary Tables.

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STANDARD OIL'S METALWORKING SERVICE brings you the right product...for the right job...right on schedule!

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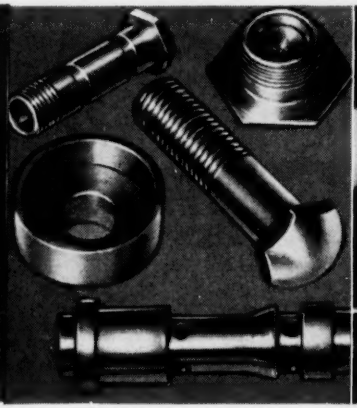
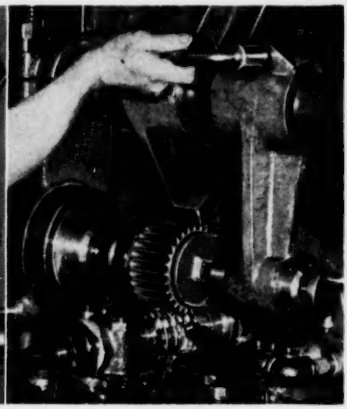
STANICUT 62FC boosted production of aluminum alloy valves from 97 to 125 per hour, gave tool life of 5,000 pieces between grinds.



STANICUT 107 BC handled wide variety of operations on brass, copper, aluminum, steel. Gives fine results on not-too-severe, high speed jobs.



PREMIER Cutting Oil extended hob life 75% on spur gear job. Meets demands for a low-priced, light colored, general-purpose cutting oil.

STANICUT Cutting Oils are special-duty products that meet today's most exacting requirements and highest production schedules.

STANICUT Oil 117 BCS for high speed operations where steels of lower machinability than free cutting screwstock are used.

STANICUT Oil 126 BCS, relatively light-colored oil, contains right amount of active sulfur for rather severe, high speed jobs.

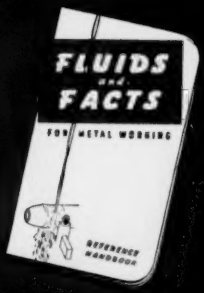
STANICUT Oil 137 BCS has high sulfur content and compounding for severe, high speed operations on either turret lathes or automatics. Suitable for either brass or steel.

STANICUT Oil 155 CS, containing maximum active sulfur and chlorine for very tough alloys of SAE 3000 and 4000 series, especially those that tend to "smear."

STANICUT Oil 166 BC — may be used as dual-purpose oil for those desiring this type of product — non-corrosive, provides lubrication for bearings, yet chlorinated and compounded sufficiently for cutting operations on free machining steels, brass and copper.

STANICUT Oil 208 BCS, high sulfur and chlorine content, yet good color and odor . . . for tough alloy steels and severe operations.

STANICUT Oil 309 BCS, a sulfurized and chlorinated oil, for heavy broaching and tapping of soft stringy steels. Can be blended with paraffin oil to handle less severe work.



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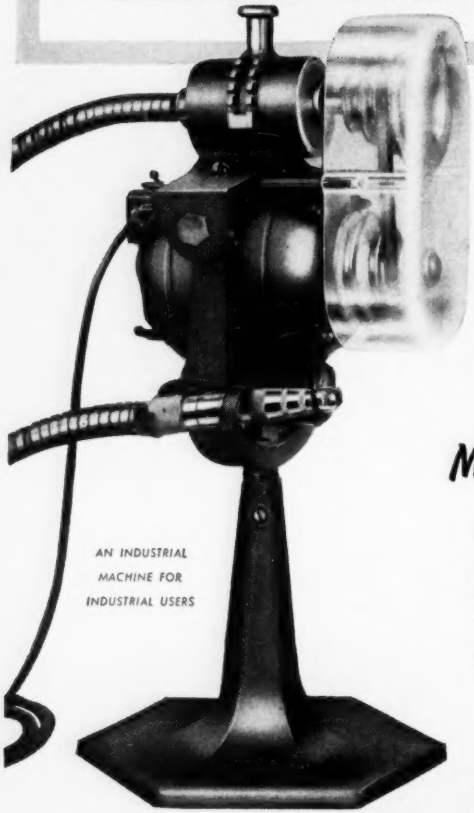
POWERFUL
FLEXIBLE SHAFT MACHINES



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

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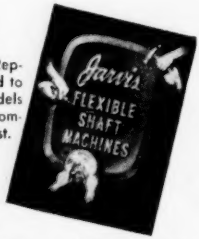
Do Your Jobs

EASIER -- FASTER -- MORE ECONOMICALLY!

Whether your operations call for GRINDING, CUTTING, BUFFING, SANDING or ROTARY FILING, Jarvis Flexible Shaft Machines are available in BENCH, FLOOR or OVERHEAD Types — in Single or Multiple Speeds to suit your Individual Requirements.

A Jarvis Factory Trained Representative will be pleased to assist you in selecting models best suited to your use. Complete catalog upon request.



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Jarvis POWER TOOLS

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

INDUSTRIAL TOOLS FOR INDUSTRIAL USERS

PRECISION MACHINE GROUND-FROM-THE-SOLID

Consistent Exellent Performance—Unusual Economy and Ultra Precision work has firmly established Jarvis Solid Tungsten Carbide Tools among users who know quality.

Make it a point today to write for our completely new 28 page illustrated catalog and the name of the Jarvis representative nearest you.

JARVIS POWER TOOLS

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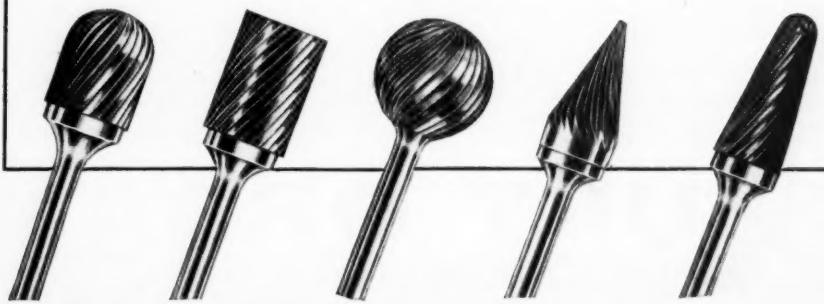
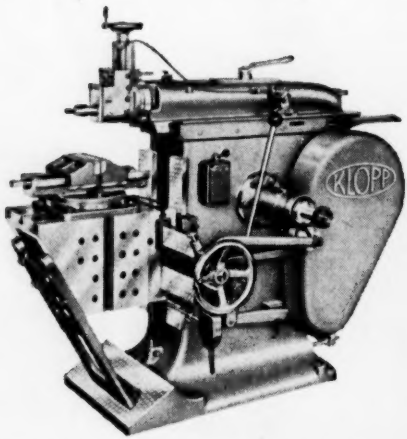
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



Now ~~72~~ 108 Busy Plants Are Cutting Machining Costs with KLOPP High-Production Shapers



IMMEDIATE DELIVERY FROM STOCK

KLOPP shapers cost so little to buy .. so little to run, yet turn out so much production, they're stepping into plant-after-plant—stepping up toolroom output and cutting down costs.

Bulky, awkward-to-handle work pieces are easily accessible and simple to set up in the KLOPP—because the *head travels to the work*. It's built for high-speed, too, by Europe's largest manufacturer of shapers—at KLOPP'S fully integrated plant —where the complete machines, including all their components from castings to electric motors, are produced.

Write for names of prominent KLOPP users near you. And ask us to quote on your requirements for one or a battery of these fast-producing cost cutters.

Engineered servicing from Orban Service Centers in Cleveland, Detroit, Newark. Stock parts from Cleveland.

SPECIFICATIONS

MECHANICAL SHAPERS—stroke lengths 16¾", 20⅔", 26⅝". Six rates of speeds with normal motor, 12 with two-speed motor. Accelerated return motion. Single lever control within easy reach of operator. Swivel work table can be set to either side at any angle up to 90°.

FULLY HYDRAULIC MODELS—stroke lengths 26", 33½", 39½". Infinitely variable ram speeds with quick return and minimum power consumption. Central operator control panel. Tool holder with graduated scale swivels 45° to either side. Self-acting downfeed of tool slide. Automatic tool lifting device available.

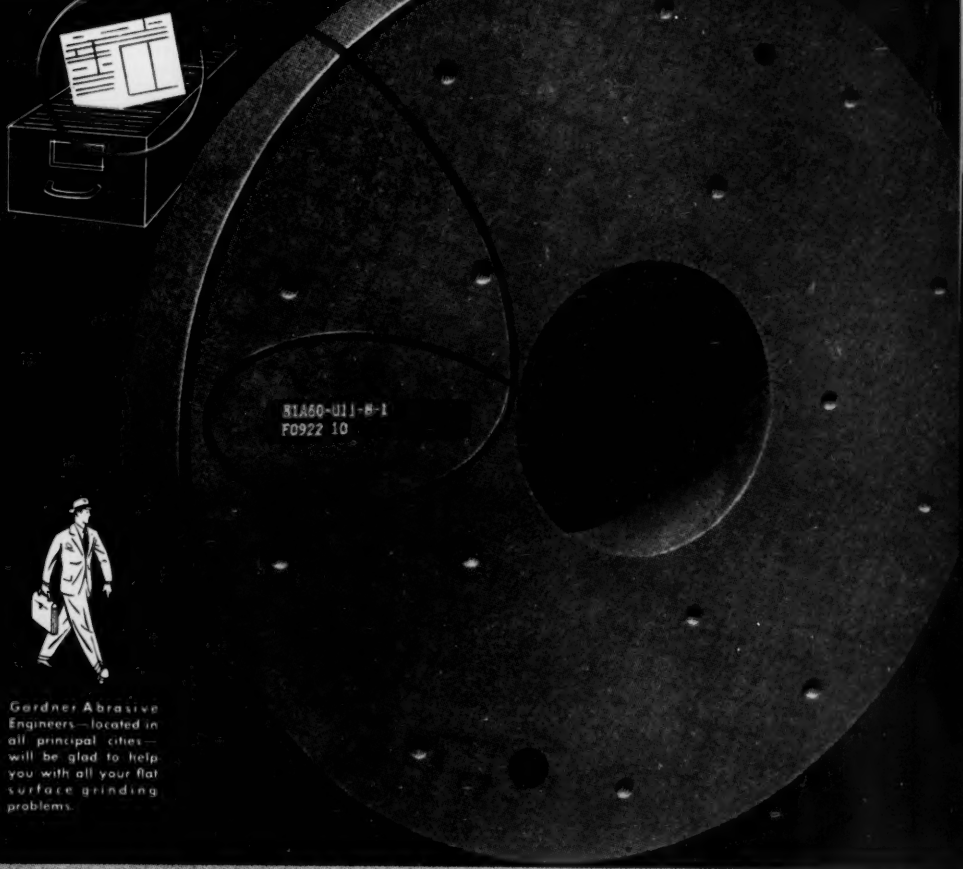
KO CO. INC. INDUSTRIAL IMPORTERS

KURT ORBAN COMPANY, INC.

205 E. 42nd St., N. Y. 17 • 4220 Prospect Ave., Cleveland 3 • 19450 James Couzens Highway, Detroit 35
1939 Santa Fe Av ., Los Angeles

Abrasive Discs Fitted To Your Grinding Needs

GARDNER



Gardner Abrasive Engineers—located in all principal cities—will be glad to help you with all your flat surface grinding problems.

Send for Gardner Abrasive Disc Guidebook for better surface grinding results.

Gardner varies abrasive type, grain size and structure until you get the *best* abrasive to meet your job requirements. You get a Gardner Customized Abrasive that meets your needs for production, stock removal, finish, tolerance. Once your specific formulation is determined, the card record goes into our permanent file. Grinding results on reorders will be duplicated because your specific abrasive formulation has been duplicated. 109 A 5

GARDNER MACHINE COMPANY

428 East Gardner Street · Beloit, Wisconsin, U.S.A.

grinding and fitting

DIFFICULT CONTOURS

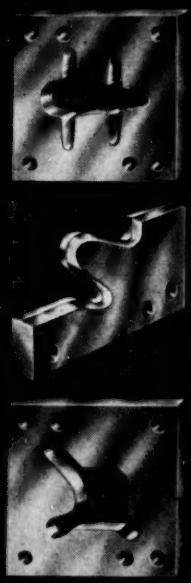
is EASY with a

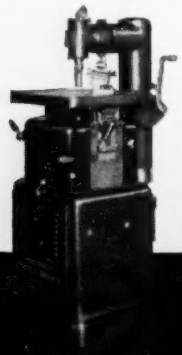
BOYAR-SCHULTZ
No. 1 Profile Grinder

A Bench model with Spindle speed of 20,000 R.P.M., Boyar-Schultz No. 1 Profile Grinder is a rapid Stock remover.

An ideal machine tool for grinding and fitting irregular inside and outside contours and profiles such as die clearances and many other grinding jobs that would otherwise require time consuming set-ups. A real time-saver, performing in minutes many jobs that formerly required hours.

Accommodates wheels 1/8" to 1" diameters.





Boyar-Schultz
No. 2 Profile Grinder

For grinding and fitting large dies and punches such as forming dies for refrigerators, tables, sanitary ware and other large work. Spindles turn at 10,000 R.P.M. Accommodates wheels 1/4" to 3" diameters.

BOYAR-SCHULTZ CORPORATION

2120 WALNUT STREET • CHICAGO 12, ILLINOIS

Designed for those who need LIGHT-HEAVYWEIGHT Machines

New 16" and 14" Band Saws by WALKER-TURNER

For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby machine" would be wholly inadequate, Walker-Turner has engineered a special class of *light-heavyweight* Band Saws.

Professional in design and operation, yet light for production machines, the Walker-Turner Light-heavyweights give industry the capacity needed for short-run production work, without the necessity of heavy investment. Available in 16" and 14" models for both metal-cutting and wood-working. For complete information, write name and address in margin below.

16" WALKER-TURNER BAND SAW

is low in initial cost, high in operating efficiency. Automatic power feed maintains a pre-set feeding pressure, lessens operator fatigue. Capacity: blade to frame 16", guide to table 8". Three-piece construction for extra strength and rigidity. 8 blade speeds. Fast, safe, and easy to handle.

SOLD ONLY THROUGH TRAINED INDUSTRIAL DISTRIBUTORS

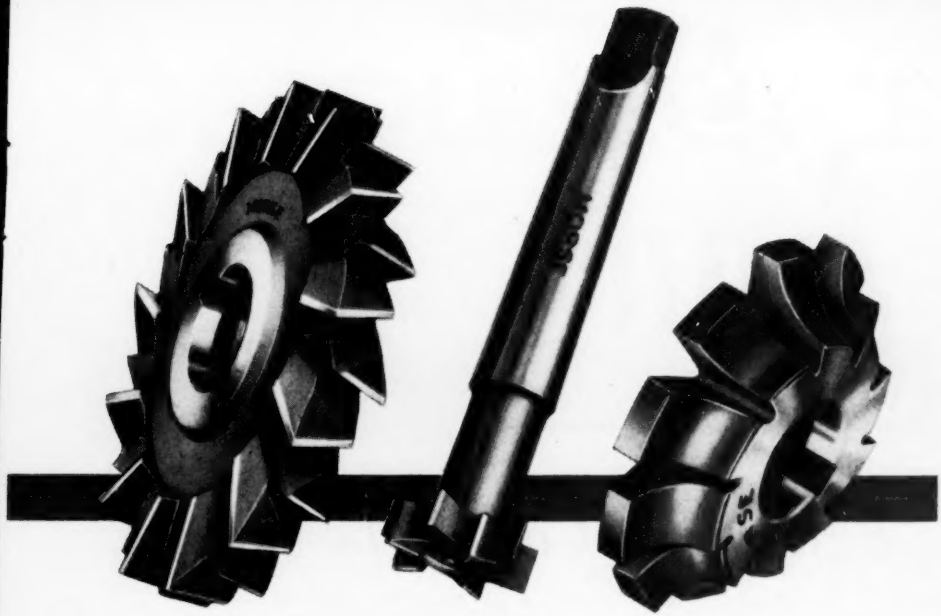
WALKER-TURNER
walker-turner DIVISION
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS
BELT and DISC SURFACERS • METAL-CUTTING BAND SAWS
LATHES • SPINDLE SHAPERS • JOINTERS

Use this space

to write for full details and specifications.
Walker-Turner Div., Kearney & Trecker Corp.
Dept. MM-7, Plainfield, N. J.
(Please write your name and address in margin of page.)

"If MORSE CUTTERS are good enough to make Morse Tools . . . then they're plenty good for us, too!"



That's right — Morse Milling Cutters are used every day in the Morse plant — to make all Morse Cutting Tools the finest precision made tools in the market.

Morse knows from years of closely checked experience, that these Cutters impart longer life, smoother cutting action, and higher return per sharpening than any other cutters. And when you "thrive on your own cooking," then that's proof that the cooking is tops!

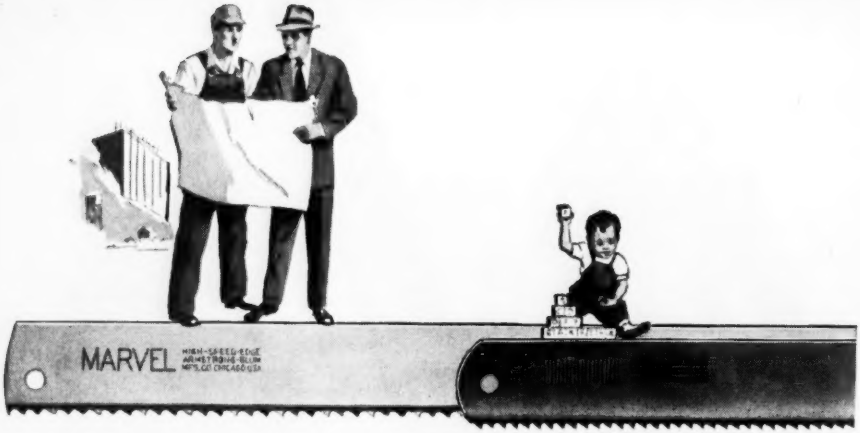
Besides the cutters shown here, your Morse-Franchised Distributor can supply you with Angle, Concave or Convex Cutters, Woodruff Keyseat and Involute Gear Cutters, and others. He's your right-hand man for cutting costs — so see him today about the Morse Milling Cutters you need in *your* operation.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time



. . . *but*
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* SAWS

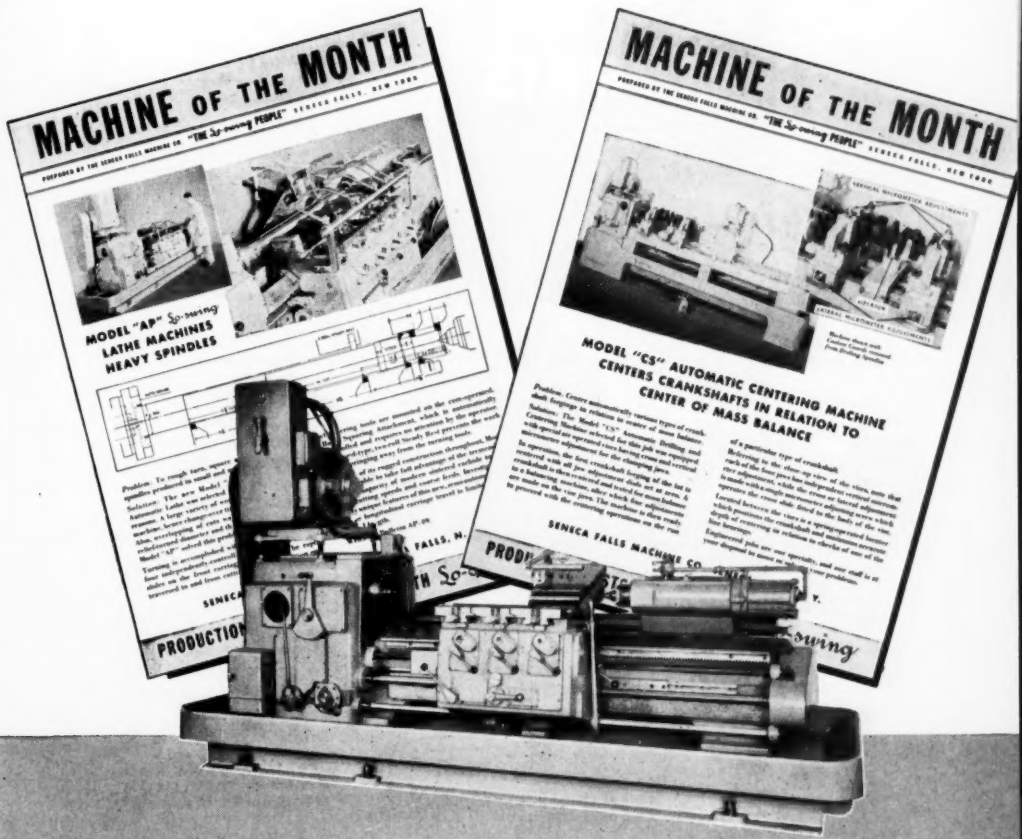
Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

HOW DO YOU MEASURE

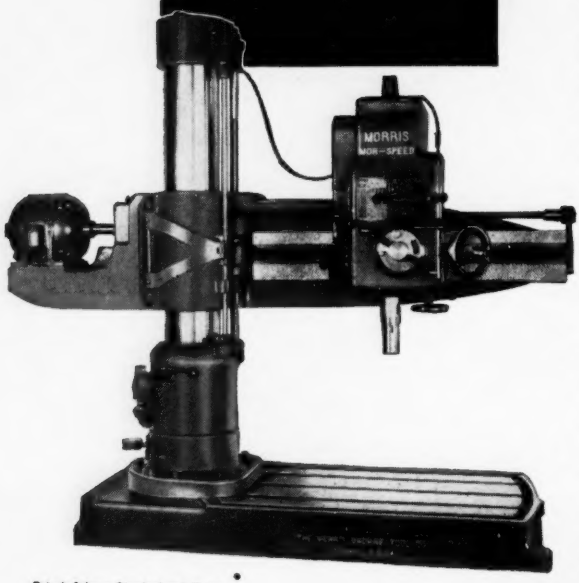
OBSOLESCENCE?

Never lose sight of the fact that your cost must be as low as your competitor's if you expect to stay in business.


MACHINE OF THE MONTH
MODEL "AP" Lo-swing LATHE MACHINES HEAVY SPINDLES
MACHINE OF THE MONTH
MODEL "CS" AUTOMATIC CENTERING MACHINE CENTERS CRANKSHAFTS IN RELATION TO CENTER OF MASS BALANCE
SENECA FALLS MACHINE CO.

Age, by itself, is only a fair measuring stick for obsolescence. A machine tool is obsolete, when replacement by a new machine, offering production economies, will pay a substantial dividend on the net investment. Many relatively new machines are now obsolete because more efficient ones have been developed that will outproduce them at lower cost. In the last six months Seneca Falls has announced new machines which, in specific cases, are paying for themselves out of savings over methods which were *efficient* 12 months ago. ● Seneca Falls Machine Co., Seneca Falls, N. Y.

get speed...
safety...
accuracy...
with
MORRIS
MOR-SPEED
RADIAL DRILLS



completely centralized controls...

On a MORRIS Mor-Speed Radial Drill every control is in sight . . . within reach . . . easy to operate fumble free!

The operator makes speed, feed and other adjustments, quickly and easily—concentrates on job, rather than on bending, stepping, stooping or reaching for awkward controls. A wide selection of automatic stops and trips cut time per operation to a minimum. Carefully designed, tested safety devices assure complete protection to machine, operator and work. Alloy steels, modern hardening methods and anti-friction bearings . . . at every wear-vulnerable point . . . plus constant lubrication for all operating parts, protect and maintain precision and make Mor-Speed Radials capable of higher production over longer periods of time.

Find out how MORRIS Mor-Speed Radial Drills can make precision work possible and profitable for you, even under your heaviest scheduling demands.

WRITE FOR BULLETIN NO. 59
Early delivery dates available.

THE MORRIS MACHINE TOOL COMPANY
934 Harriet St. CINCINNATI 3, OHIO

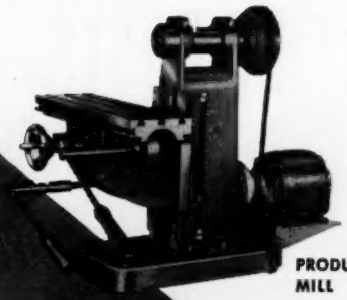
9-inch Column Standard and Heavy Duty models with 3 and 4-foot arms.

11-inch Column Heavy Duty models with 3, 4, 5, and 6-foot arms.

a better product at less cost —with precision PLUS *production*

Morris

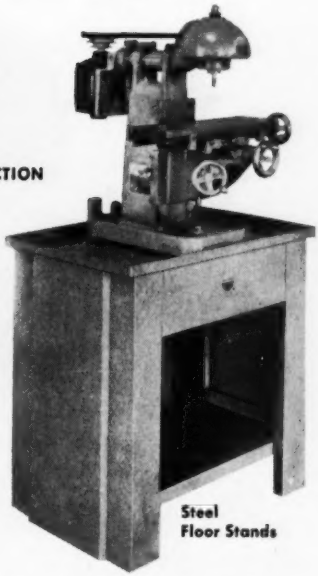
These 3 precision Benchmasters make money in every shop!



PRODUCTION MILL

HORIZONTAL MILL

VERTICAL MILL



Steel Floor Stands

It's real economy to equip your shop with one or more Benchmaster mills. Why? Because these millers do small jobs with the same precision and speed as big, expensive mills. In fact, several small Benchmasters will even outproduce a big mill on work within their capacity! But consider the tremendous difference in investment and savings made! Set-ups are easier and faster. Operation is simple, cutting operator costs!

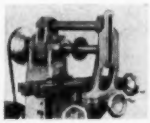
MILL HORIZONTALLY OR VERTICALLY WITH THE SAME MACHINE! Simply exchange spindle assemblies to convert. Production models with lever feed also available.

Ask for complete information on Benchmaster Mills today!
Benchmaster Manufacturing Co., 1835 W. Rosecrans Gardena, Calif.

Full line of accessories for every milling requirement!

6" and 8" Rotary Tables

Swivel-Base Vise



Overarm Brackets

Arbors and Collets

benchmaster

World's largest manufacturer of small punch presses and mills.

are your CUTTING COSTS really down far enough

NO. 3 1/3 FRICTION SAW
HYDRAULIC FEED

you'll never know for certain until you COMPARE your PRESENT cutting speed with

the faster Kling *HIGH SPEED* FRICTION SAW!

What is friction sawing?
It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop.
No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

Free friction sawing information. *Write today for free booklet on Friction Sawing. Learn how you can profitably apply Friction Sawing in your plant.*

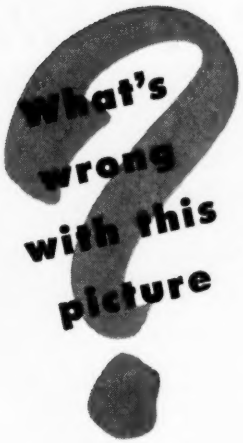
KLING BROS. ENGINEERING WORKS
1328 N. Kostner Ave., Chicago 51, Illinois

How long would it take you to cut these pieces?	Cut it with a Kling in † . .
24" 100 lb. I Beam	28 seconds
15" 55 lb. Channel	15 seconds
8" x 8" x 34.3 lb. H Beam	10 seconds
100 lb. A.R.A. Rail	9 seconds
6½" x 6½" x 19.8 lb. Tee	5 seconds
8" x 8" x ¾" Angle	11 seconds
3" Square	10 seconds
4" Round	15 seconds
6" O.D. Tube, ½" Wall	11 seconds

† Approximate Times

Since 1892 **Kling** ***...an investment in speed!***

600BMMR



● Nothing at all! But chances are any veteran shop man will instantly ask, "What's the idea of having an 'Automatic' in the turret lathe department?"

The "idea" is simply this: Warner & Swasey 1 AC Single Spindle Automatics can handle many of your regular small and medium lot runs *more profitably* than your hand-operated machines.

That's because the 1 AC operator can change setups quickly for the job at hand. There are no cams to change—he simply re-adjusts trips for feed, speed and stroke controls. And, on certain jobs, one man on a 1 AC can turn out more work, of more uniform accuracy, than two men on hand-operated machines.

To find out whether 1 AC Single Spindle Automatics fit into your production picture, call in your nearest Warner & Swasey Field Representative. He'll study your jobs and methods and advise you correctly.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

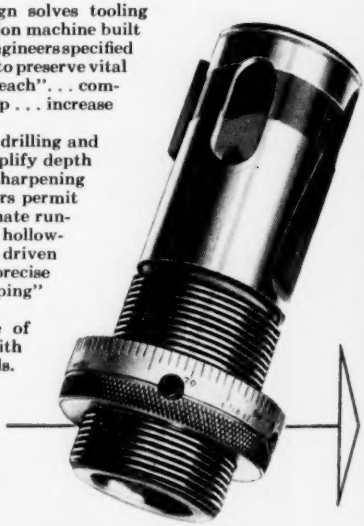
SCULLY JONES Precision Holding

Squeezes every "tenth" out of each cut on 10-Station Double End Trunnion Machine

Here's how smart machine design solves tooling problems on a BARNESDRIL 10-station machine built for automotive work. BARNESDRIL engineers specified Scully-Jones *Precision Holding* Tools to preserve vital accuracy of spindles having a "long reach"... compensate for tool wear... speed setup... increase production.

Scully-Jones Adjustable Adapters on drilling and reaming spindles speed tool changes, simplify depth adjustments at individual spindles after sharpening tools to new lengths. Drill and Tap Drivers permit maximum utilization of cutters, help eliminate run-out, provide a positive, no slip drive. Boring, hollow-milling, facing, reaming and tapping tools are driven by Scully-Jones Floating Holders to maintain precise alignment, eliminate bell-mouth, prevent "cramping" or damage to cutting teeth.

Builder or buyer—you take full advantage of critical machine and cutting tool accuracies with Scully-Jones *Precision Holding* and driving tools. Ask your Scully-Jones representative today!



Scully-Jones Quick-Lock Adjustable Adapters are used on each of 11 spindles in auxiliary head.

QUICK-LOCK ADJUSTABLE ADAPTERS on multiple drilling, tapping and reaming spindles give you maximum flexibility of setup. Pilot nose minimizes tendency of adapters to bind or jam. Tool changes are fast.

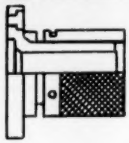
ACCURATE FIT assured by National Acme thread. Top face of nut is square within .002" to .003", holds original accuracy of spindle when locked in place. Small diameter permits close-center work.

THERE'S A SCULLY-JONES PRECISION TOOL FOR EVERY HOLDING AND DRIVING NEED

Recessing Tools
For automatically locating and controlling depth of groove.

Tap Chucks
Eliminate bell-mouthed and oversized tapped holes. Save costly setup time.

Floating Holders
Give unrestricted parallel or angular float. Reduce tool breakage.



"Roll-Lock" Chucking Tools
Accurate, centering shrink fit holds work or tool. Powerful and accurate.

helps build BARNESDRIL *accuracy*

Special 10-station Double End Trunnion Machine, designed for automobile manufacturer, produces 60 oil pump bodies per hour. Machine is "factory-equipped" with Scully-Jones *Precision Holding* Tools. Builder: Barnes Drill Co., Rockford, Illinois.

SCULLY JONES

Precision Holding

FOR HOLDING PRECISION

Scully-Jones and Company,
1909 South Rockwell Street, Chicago 8, Illinois

Gentlemen: I'm interested in learning more about Scully-Jones tools.

☐ Send Bulletin 6-50 describing Adjustable Adapters.
☐ Send catalog of your complete line.

Name_____

Company_____

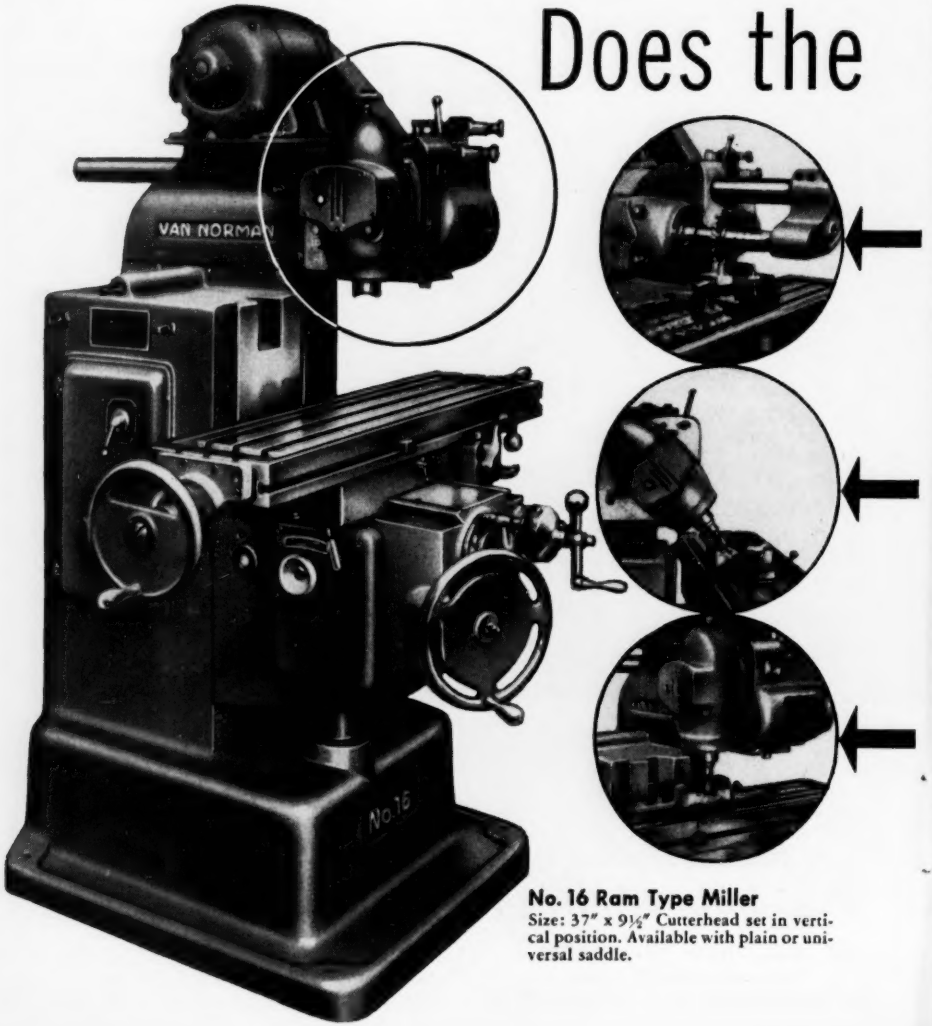
Address_____

City_____ State_____

Why Buy Three Single

SINGLE VAN NORMAN

Does the



No. 16 Ram Type Miller
Size: 37" x 9½" Cutterhead set in vertical position. Available with plain or universal saddle.

Purpose Millers when a **RAM TYPE MILLER** Work of All Three!

HORIZONTAL MILLING

Operator simply swivels the adjustable cutterhead to horizontal position . . . locks it in place . . . and he is ready for horizontal milling. Hardened stop set at factory assures positive 0° setting.

ANGULAR MILLING

With the cutterhead locked in the desired angular setting, the operator performs angular milling operations. Cutterhead is graduated in degrees from 0° to 90° for easy positioning.

VERTICAL MILLING

Conventional vertical milling is easily performed by locking the head in vertical position. Permanently fixed hardened stop permits accurate setting of cutterhead at 90°.

Conventional horizontal and vertical, as well as angular milling all on ONE miller . . . that's what you get with Van Norman Ram Type Milling Machines. The adjustable cutterhead, mounted on a movable ram, enables you to perform all types of milling by simply positioning the cutterhead in the desired position. Not only does this important feature give you the workability of *several single machines*, but it also mipimizes work set-ups . . . cuts idle machine and operator time by permitting you to meet job to job milling requirements as they occur.

Whether it is for toolroom, production, machine shop, tool and die shop, or laboratory work, Van Norman Ram Type Millers increase production and cut costs. A wide range of models in various sizes are available to fit most every application. Write for information.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

A SPINDLE YOU CAN *Specify* WITH

CONFIDENCE

THE POPE PRECISION SPINDLE

1 HP, 3600 RPM MOTORIZED

with Super Precision Roller Bearings and Separate Thrust Bearings

The picture shows you why this Spindle has swept the field for 6″ x 18″ surface grinder application (producing finer finishes at lower cost) — and why it has been promptly drafted for hundreds of other jobs.

There are many types of bearings but none can approach the superb combination of ruggedness and precision found in the double row cylindrical roller bearings you see in this Spindle. They have tremendous load carrying capacity, produce a superior finish and assure long, trouble-free operation.

Note the thrust bearings. There is no endwise movement of the shaft in either direction.

Spindles have the Pope System of lubrication and are dynamically balanced in full assembly.

Applicable to all new grinders and to those now in service. Write for price and delivery.

No. 95

Specify **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

What do *you* look for in a Tap, Mr. Johnson?

That will be *"performance-ability"* . . . something that you cannot see at first glance.

This has been built into the tap through proper selection and heat treating of the tap material, and the precision processes of machining the tap . . . processes that challenge the statement so often heard, "taps are all alike." That's why it pays to specify —

Hanson-Whitney...

Through the Hanson Process . . . the *original method of finishing after hardening* . . . Hanson-Whitney has for 34 years produced a quality line of precision taps. We have never manufactured cut thread or unfinished taps.

Yes, Mr. Johnson, that's why Hanson Process Taps give you the dependable day-in, day-out production performance recorded on your cost sheets. Naturally, the right tap for the specific job is essential. Ask the Hanson-Whitney representative for his recommendations.

the **HANSON**
Threading Processes
Offer Complete
Coordinated
Responsibility

The Machine Tools
The Cutting Tools
The Measuring Gages

H

HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.

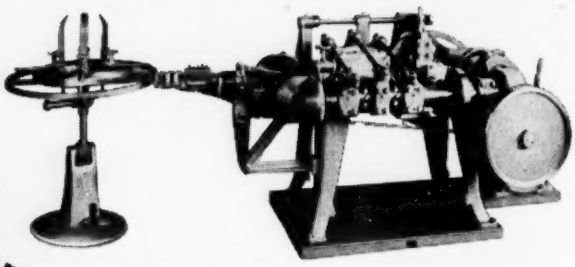
160 Bartholomew Avenue, Hartford, Connecticut, U. S. A.

Our "Mr. Johnson" typifies the thousands of practical machinists in America. You'll find him in your shop. Ask him what he thinks about H-W Taps.

NILSON FOUR-SLIDE

It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

Wire and Ribbon Metal FORMING MACHINES



UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

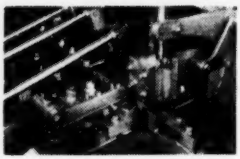
Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with NILSON'S open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

Model SF3 NILSON 4-SLIDE, shown above, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.

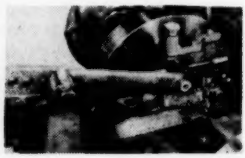
Range of sizes

Wire Forming —
1/32" through ½" wire. Feeds up to 32".

Ribbon Stock Forming —
1" through 3½" wide material. Capacity of press section 5 to 30 tons; 50 to 75 tons in heavy duty types.



Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.



Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

For specific recommendations — send details of your operation.

FATHER'S SPRING LIFE A NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

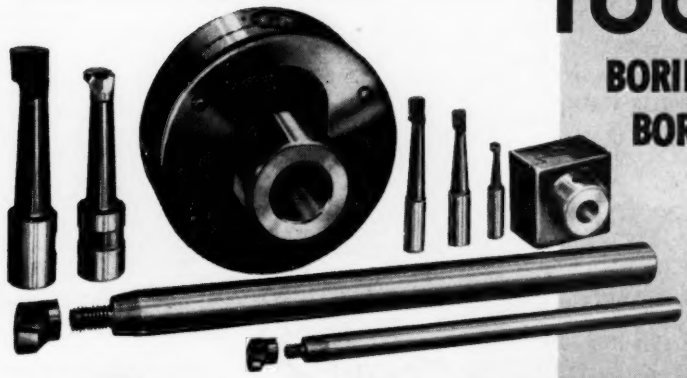
THE A. H. NILSON MACHINE COMPANY
1514 Railroad Avenue • Bridgeport 5, Connecticut
CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • HAMILTON, ONT., CANADA

Automatic Chain Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

for more *Accurate* cuts...
greater *Rigidity* in

BORING TOOLS

BORING HEADS
BORING BARS



Use CRITERION

BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ⅜ to 1¾ inches diameter. Bore holes from ⅛ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

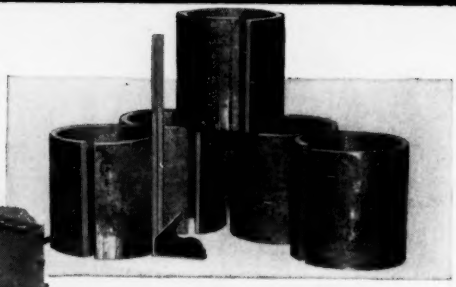
These tools will cut your boring costs.
See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

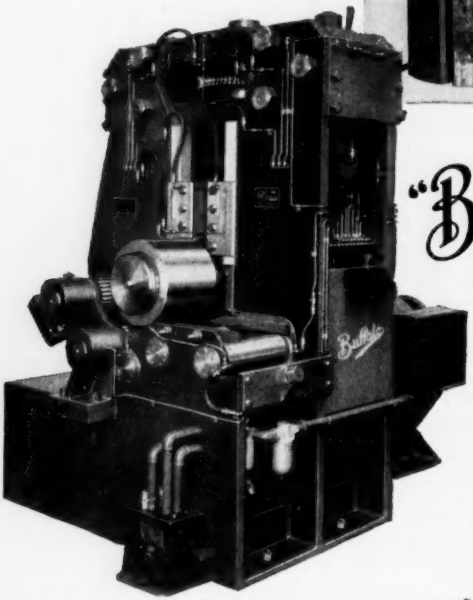
CRITERION
MACHINE WORKS
9312 SANTA MONICA BLVD • BEVERLY HILLS, CALIF.

"Buffalo" Tips on Metal Bending

Get SPEED into your production of RINGS and CYLINDERS

GEAR RIMS • MOTOR FRAME SHELLS
GENERATOR BODIES • SMALL TANKS
PIPE COUPLINGS • ROLLER BEARING
RACES — 1/16" to 1-3/4" IN
THICKNESS





"Buffalo" WRAPPING ROLLS

Here's a single-pass cold wrapping at a profitable rate of speed! The No. 3 Wrapping Roll shown features pneumatic foot control, horizontal material feed, easy roll changes, quick release of finished work (no outboard bearing on mandrel). Permits high production. Rolls and shafts are alloy steel; frame and base are all-welded steel for extreme rigidity and strength. If you're planning to make a circular or cylindrical product, there's no lower cost method than with a "Buffalo" Wrapping Roll.

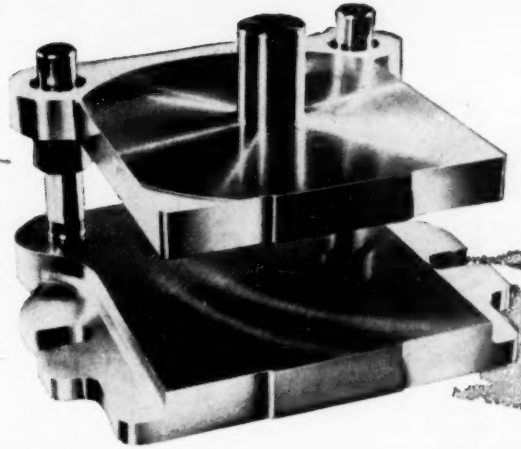
Write for Bulletin 3150 for all data.

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY
388 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

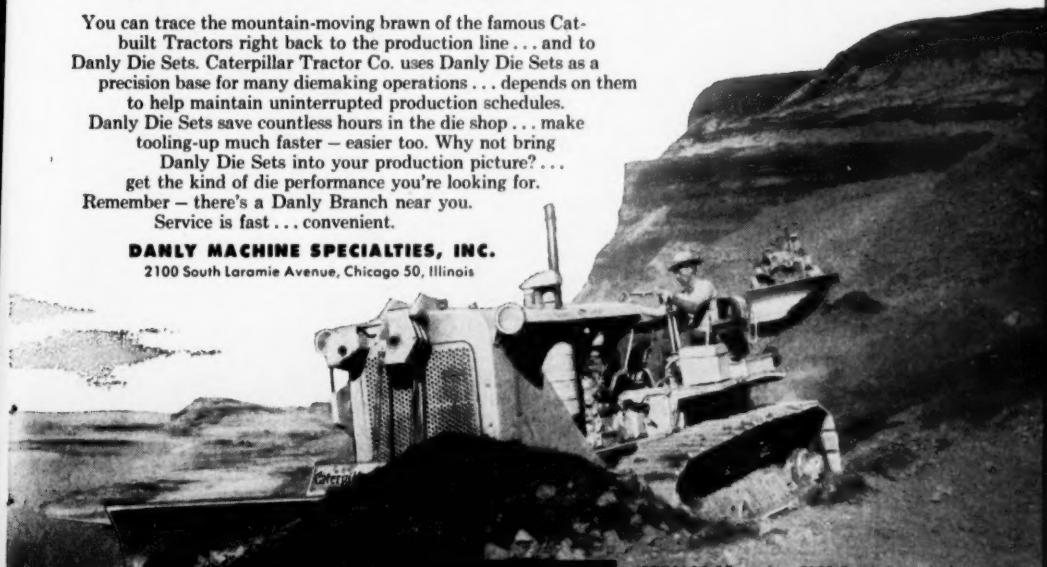


DANLY DIE SETS

help build the mighty Cat Diesel Tractor

You can trace the mountain-moving brawn of the famous Cat-built Tractors right back to the production line . . . and to Danly Die Sets. Caterpillar Tractor Co. uses Danly Die Sets as a precision base for many diemaking operations . . . depends on them to help maintain uninterrupted production schedules. Danly Die Sets save countless hours in the die shop . . . make tooling-up much faster – easier too. Why not bring Danly Die Sets into your production picture? . . . get the kind of die performance you're looking for. Remember – there's a Danly Branch near you. Service is fast . . . convenient.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



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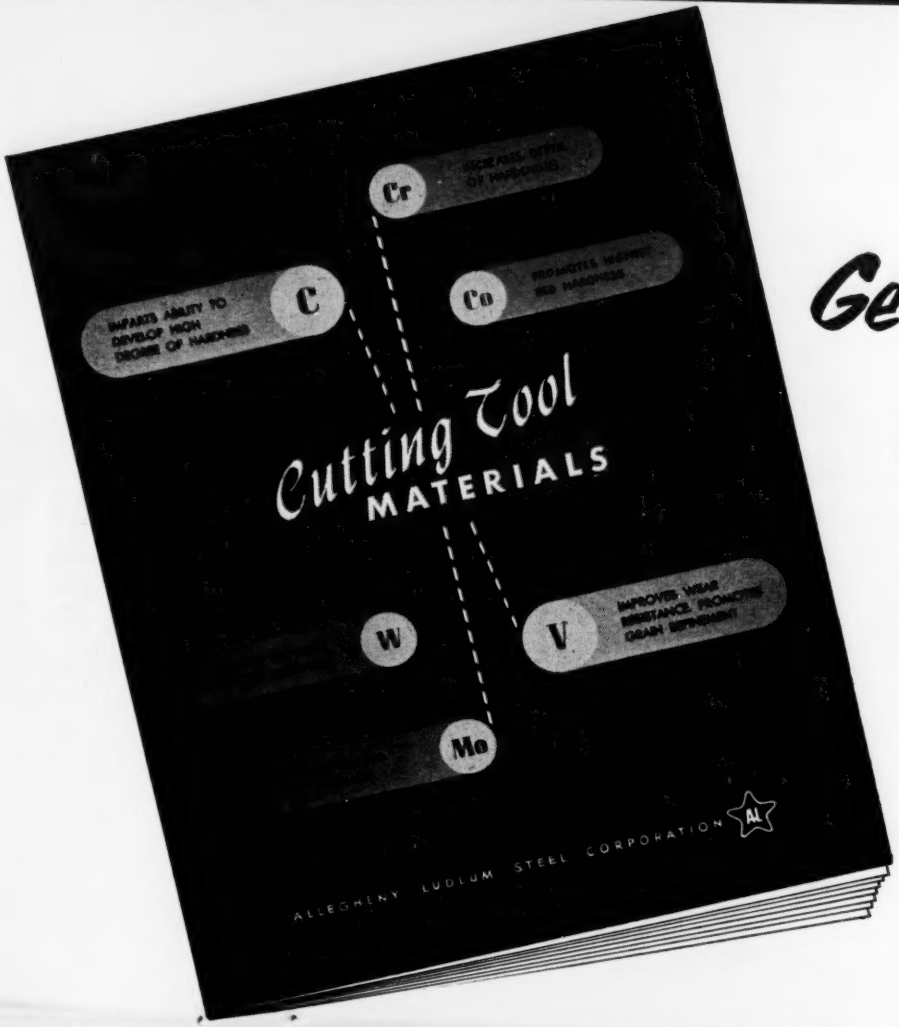
*CLEVELAND	14	1550 East 33rd Street
*DAYTON	7	3196 Delphos Avenue
*DETROIT	16	1549 Temple Avenue
*GRAND RAPIDS		113 Michigan Street N.W.
INDIANAPOLIS	4	5 West 10th Street
*LONG ISLAND CITY	1	47-28 37th Street
*LOS ANGELES	54	Ducommun Metals & Supply Co. 4890 South Alameda
MILWAUKEE	2	111 East Wisconsin Avenue
*PHILADELPHIA	40	511 W. Courtland Street
*ROCHESTER	6	33 Rutter Street

*Indicates complete stock



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LOOK in this BOOKLET

when you're *puzzled about Tool Materials!*

A-L OFFERS YOU
Complete Service
for Modern Tooling

By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8½" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

ADDRESS DEPT. MS-43

You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

"Should we use *Carbide* on this job? What grade?" . . . or, "How about tooling up with *Cast Alloy* for that other run?" . . . or, "Can we cut this extra-tough stock fast enough with our usual grade of *High Speed Steel?*"

This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa*

For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 3703

AL
FINE TOOL STEELS
SINCE 1854

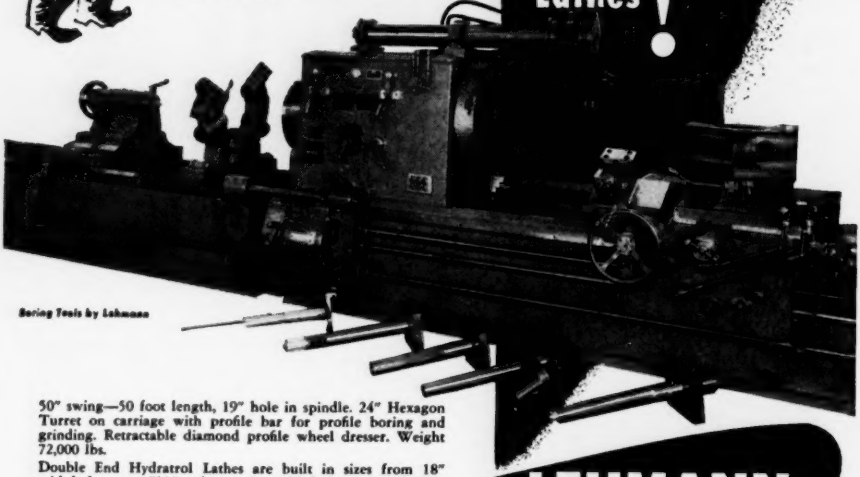
42" swing, 16 foot bed, 18" hole in spindle —Special headstock for short work piece. Semi-automatic multiple, longitudinal and cross feeds hydraulically operated on both ends of headstock.

But Boss and workers agree that you get amazing new efficiency with these

LEHMANN

Large Hole

DOUBLE-ENDER Hydratrol Lathes!



Boring Tools by Lehmann

50" swing—50 foot length, 19" hole in spindle. 24" Hexagon Turret on carriage with profile bar for profile boring and grinding. Retractable diamond profile wheel dresser. Weight 72,000 lbs.

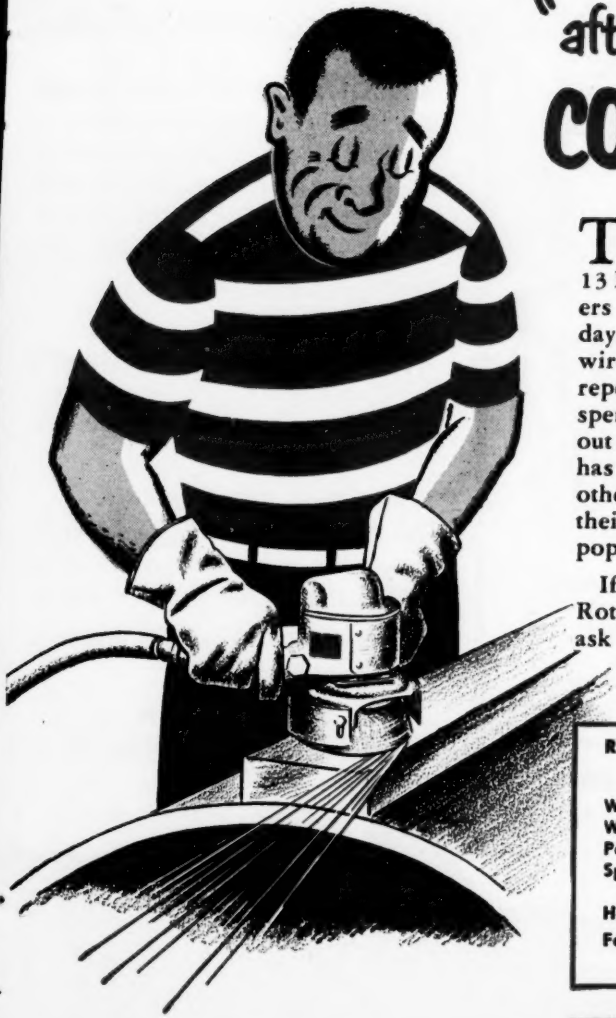
Double End Hydratrol Lathes are built in sizes from 18" with holes up to 7⅛" to larger sizes with holes to suit the job. Double End operations avoid necessity for resetting the work, and insure relative concentricity of boring and turning operations and squareness of faces at both ends.

DIVISION OF NOVO ENGINE CO.

LEHMANN MACHINE COMPANY

GRAND at CHOUTEAU • ST. LOUIS 3, MO.

Maintenance report from user of 13 Rotor Grinders:



"after 14 months COST $0.00"

THIS large manufacturer of electrical equipment has been using 13 Rotor B-35 Vertical Air Grinders for 14 months—two shifts per day, 6 days per week—for sanding, wire brushing and grinding. They report that not one cent has been spent for maintenance—no time out for repairs! And metal removal has been far greater than with other types of grinders . . . and their good balance make them popular with operators.

If you haven't seen these new Rotor Vertical Grinders in action, ask for a demonstration today!

AIR O'TOOL

ROTOR VERTICAL SPECIFICATIONS

	B-35	B-12
Weight	10¾ lbs.	10 lbs.
Wheel Size	6" Cup	6" Cup
Pad Size	7" or 9"	7" or 9"
Speeds	6000, 5000, 4500, 3500	6000, 5000, 4500, 3500
Height	7½"	7"

For cup wheels, sanding pads, cut off wheels, wire brushing.

WRITE TODAY FOR BULLETIN No. 40

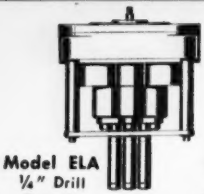
AIR

THE ROTOR TOOL CO

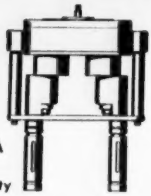
CLEVELAND OHIO

HIGH CYCLE

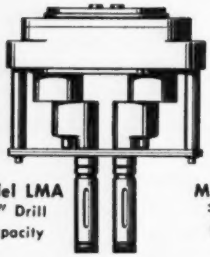
HEADS to Solve Your Drilling, Tapping, Boring Problems



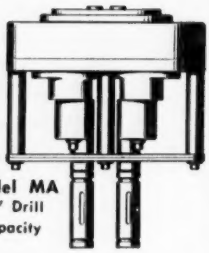
Model ELA
¼" Drill Capacity



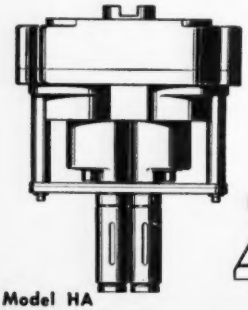
Model LA
13/32" Drill Capacity



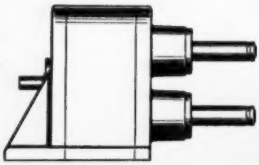
Model LMA
⅝" Drill Capacity



Model MA
¾" Drill Capacity



Fixed Spindle Models
Size and Capacity as specified



Model HA
1¼" Drill Capacity

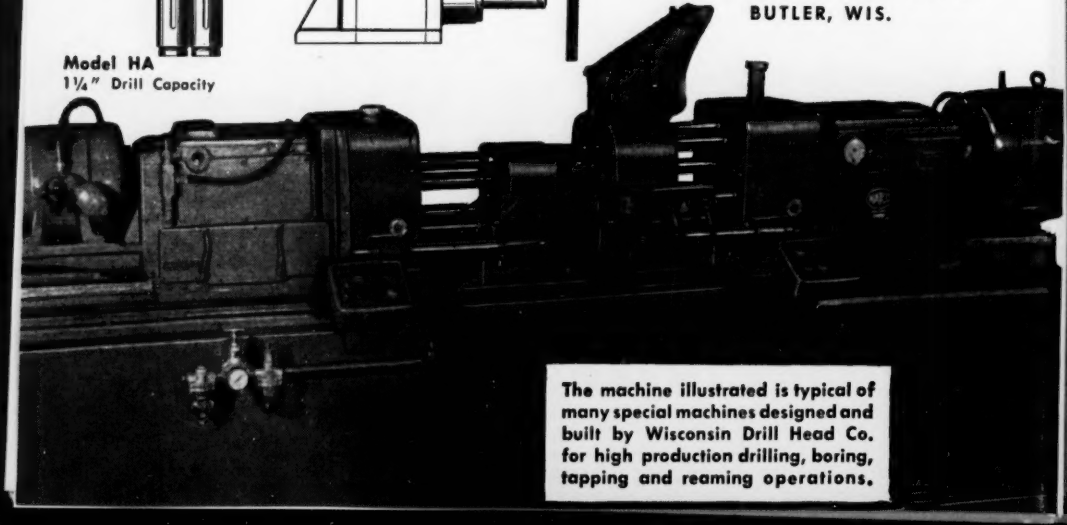
WISCONSIN *Adjustable Spindle*
Drill Heads completely gear driven... are available in 5 Standard Models, with 2 to 8 spindles and Drill Capacities from ¼" to 1¼" . . . permit adjustment to any hole pattern. Adjustable Heads with 9 or more spindles are built-to-order.

WISCONSIN *Adjustable Spindle*
Drill Heads...have Two-Piece Positioning Templates for Fast, Accurate Setups that stay put.

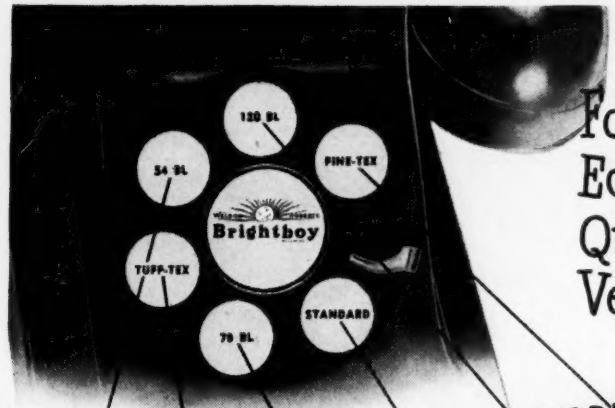
WISCONSIN *Fixed Spindle*
Drill Heads are built to special order in any size or capacity specified for Drilling, Tapping, Reaming and Boring.

Look to Wisconsin for Drill Heads to solve Your Problems.

WISCONSIN
DRILL HEAD COMPANY
BUTLER, WIS.



The machine illustrated is typical of many special machines designed and built by Wisconsin Drill Head Co. for high production drilling, boring, tapping and reaming operations.



For New Economy... Quality... Versatility...

DIAL THESE BEST NUMBERS FOR MODERN FINISHING

54 BL	TUFF-TEX	70 BL	STANDARD	120 BL	FINE-TEX
For faster finishing action on all metals.	*For finishing action on sharp burrs and edges.*	*Wide range of finishing action on all metals.*	*General finishing action on all metals.*	*Wide finishing range on medium-hard and soft metals; high polish on hard metals.*	*Polishing, finishing and burring soft metals; cleaning medium-hard and hard metals.*

See—save—profit—from Brightboy's almost unbelievable action! This working combination of ***special-texture, cushioning rubber and formula-matched abrasive*** gives you a completely fresh concept of finishing—many, many applications beyond the limits of other methods.

You get smooth, fast finishing of stainless steels, forged aluminum, hard metals and all others—and plastics, wood, glass, laminated materials. You can BURR, CLEAN, FINISH, POLISH, IN ONE OPERATION.

A TEST SOLVES YOUR PROBLEMS. Ask your dealer for the Brightboy sample card and Catalog-Manual. Write us if he cannot supply you, or on any problems where finishing is involved.

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Brightboy
RUBBER CUSHIONED ABRASIVES

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WELDON ROBERTS RUBBER CO.
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America's Pioneer Manufacturer of Rubber-Bonded Abrasives

IMPORTANT ANNOUNCEMENT!

A COMPLETE LINE OF NEW, PRECISION MAGNETIC BASE TOOLS *that surpass all others*

★ MOUNTS TO CURVED OR FLAT SURFACES INSTANTLY!

★ New circuit develops the most powerful magnet for its size made.

★ Many new improvements permit any adjustment combination heretofore regarded as impossible.

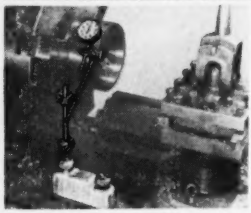
ENCO TINY TITAN TRADE MARK

NEW! Invaluable precision adjustment.

NEW! Ball swivel and stem of non-magnetic material.

NEW! Sure-grip non-breakable tenite plastic case 1¼" wide, 4" long and 1¾" high.

TINY-TITAN No. 160



Model 160 being used to indicate workpiece on engine lathe.

NEW! Knurled jack-type magnet release and positioning screw.

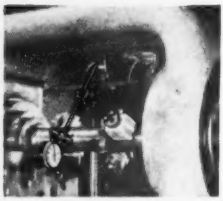
NEW! Magnetic pull 125 lbs.

NEW! Fool proof adaptor allowing 360° adjustment in all directions.

NEW! 3-step universal rod for all indicators. Sizes ⅛2", ¼" and 5/16" diameters.

Offset clamp rod for lug back indicators.

NEW, SUPERIOR TINY-TITAN No. 100



Model 100 being used to align fixture in production mill.

- Every indicating problem now easily solved.
- No more indiscriminate clamping.
- All materials and workmanship unconditionally guaranteed.

NEW! 3-step universal rod for all indicators. Sizes ⅛2", ¼" and 5/16" diameters.

NEW! Ball swivel and stem of non-magnetic material.

NEW! Sure-grip non-breakable tenite plastic case 1¼" wide, 1 3/16" long and 1½" high.

NEW! Fool proof adaptor allowing 360° adjustment in all directions.

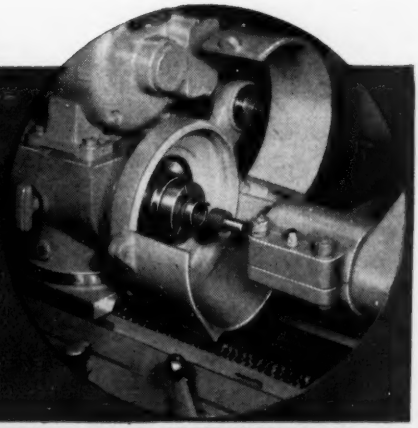
NEW! Magnetic pull 65 lbs.

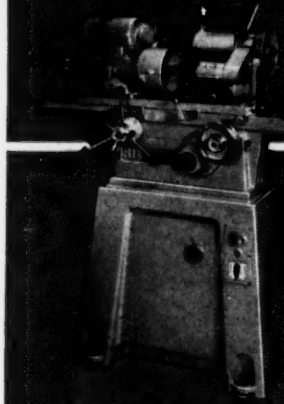
SEND NOW FOR BULLETIN No. 605 describing TINY-TITAN complete new line, including Models No. 120 (magnifier), 130 (precision adjustment indicator holder), 150, 200 (Handi-Lite), and 250 (magnetic base lighting unit).

ENCO MANUFACTURING COMPANY, Dept. 173
4520-26 W. Fullerton Ave., CHICAGO 39, ILL.

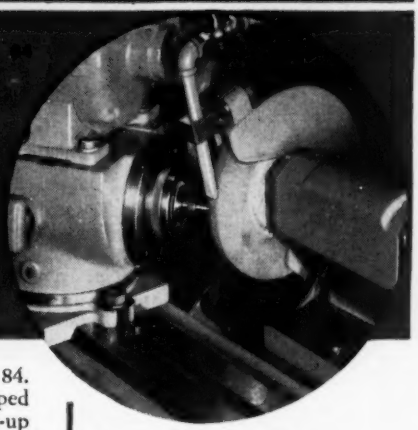
Order from your mill supply dealer or send order with name of your mill supply dealer

A new small hole grinder





Easily converted for external grinding



Flexibility keynotes this new Rivett Model 84. Primarily a small hole grinder, it may be equipped for external grinding. Simplicity reduces set-up time on the variety of work normal to the tool-room and die shop. Collets and step chucks quickly mount single or repetitive pieces.

The new Rivett 84 grinds holes from the smallest up to 3″ diameter, with a maximum 4″ depth depending upon diameter; external work to 3″ diameter by 4″ length.

If you need versatility with extreme accuracy, you will want to learn more about this new grinder. Send for Catalog 84.

FEATURES

★ Optional Wheelheads for internal and external spindles.

★ Internal Spindles 12,000 to 35,000 r. p. m. Sealed from grit. Pre-lubricated.

★ Workhead Spindle mounts draw-in collets and step chucks directly.

★ Micrometer Table Stop for positioning work when shoulder grinding.

★ Mechanical Power Table Travel with infinite adjustment of speed and stroke.

RIVETT LATHE & GRINDER, Inc.

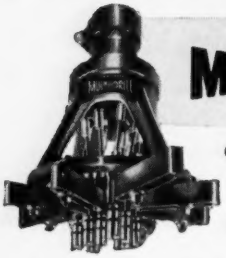
Dept. MMSR-7, Brighton 35, Boston, Mass.

For More Precision Work RELY ON RIVETT LATHES AND GRINDERS
The Master Craftsman's Master Tools

Commander PRODUCTION TOOLS

SPEED PRODUCTION...

LOWER COSTS



Adjustable MULTI-DRILL

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to ½". Extension Spindles available to increase area to 22½". Special adaptations available.

"The tapper that thinks for its operator"

Adjustable full range torque control instantly stops any tap when it's dull, loaded, strikes a hard spot, or bottoms in blind hole tapping. Assures maximum production, cuts rejects, even with inexperienced operators.

Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to ¾" Taps
- Automatic Tap Protection
- Furnished to Fit Any Drill Press

SELECT-A-SPINDLE

- Drills, Reams, Taps on 1 Drill Press Spindle
- Increases Production
- Improves Accuracy
- Reduces Costs
- Can be Used on Any Drill Press

Save time, reduce handling with a Commander SELECT-A-SPINDLE Dual Speed Turret Head. Speed selection on each spindle permits tapping, drilling, reaming at recommended speed. Taps on 1, 2 or all 3 spindles. Positive indexing of head without stopping motor. Ruggedly built for high production work.

Write FOR CATALOG and the name of your nearby Commander Distributor

Commander MFG. CO.

4219 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Get EXTREME ACCURACY— *use*

OLIVER ACE

Universal Tool and Cutter Grinders

Direct Reading for Clearance

—Reduces Fatigue

—Eases Operators' Jobs

Grinding cutters quickly and accurately is a must in the modern toolroom. Oliver Ace grinders have been turning out precision-sharp cutters in toolrooms everywhere for years, gaining a solid reputation for their ease, speed and simplicity of operation. The Oliver Ace is easy on the operator too, since it requires no computation yet handles a wide range of cutter grinding. It's faster on most grinding operations — the set-up is simple — the direct reading for clearance reduces fatigue, eases operators' jobs (no stoop . . . no squat . . . no squint).

Oliver Ace Cutter Grinders have proved their dependability. They're soundly engineered, efficient, and economical to operate. They easily grind the most difficult cutters — giving guaranteed accuracy — excelling on high speed and Tungsten-Carbide work.

Priced to meet your budget, the ACE excels for grinding face mills up to 15" — also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing.

See our catalog in Sweet's Directory

2 MODELS: Standard and Heavy Duty (illustrated)

Write Today for Complete Data

OLIVER INSTRUMENT CO.

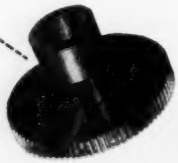
1430 E. MAUMEE • ADRIAN, MICHIGAN

MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

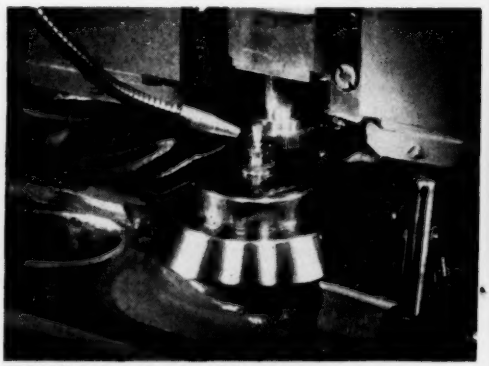
Direct Hits take Fellows-Cut

ACTUAL SIZE



SPECIFICATIONS

Material	Corrosion Resistant Steel 416
Outside Diameter	1.2812 + .000 —.001
Pitch Diameter	1.2500 + .0000 —.0005
Concentricity T.I.R.	.0004"
Diametral Pitch	64
Pressure Angle	14½°
Number of Teeth	80
Face Width	3/16"



FELLOWS CUT...by nine 3" Gear Shapers

Fellows

The FELLOWS METHOD
...in action!

Instrument Gears by the TON

A typical one of Arma Corporation's automatic aiming mechanisms has some 3,500 gears working in combination. These gears deliver motion only. Excessive pitch line run-out must be avoided or hits become misses.

a fair question

What is the quickest and most economical way to mass produce this accuracy?

Arma has picked the Fellows Method time and time again. Here are 4 reasons why:

Accuracy—scores of manufacturers in their own field could readily testify to mass production within unusually close tolerances with Fellows equipment.

Speed—a typical gear, specified at left, was cut, shaved and inspected in 4 minutes, 40 seconds.

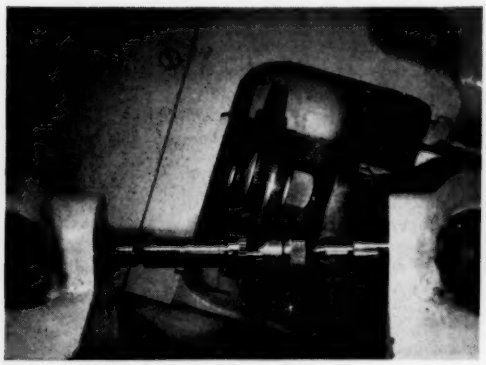
Versatility—the Fellows 3" Gear Shaper cuts gears from 1/16 inch pitch diameter to 3 inch pitch diameter.

Economy—one man runs 3 machines. Easily accessible fixtures cut change-over time.

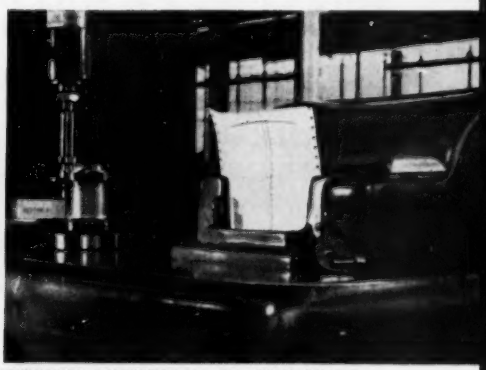
This is the Fellows Method in action. We would welcome an opportunity to discuss your gearing problems at your convenience.

PRODUCTION DATA

Cutting—	2 Cut Cam .005 Finish Cut	
	Type of Operation	Preshave
	Feed per stroke of cutter	.0045"
	Strokes per minute	700
	Cutting time	**3.5 minutes**
Shaving—	2 Cycle Cam	
	Shaving tool dia.	3.5"
	Shaving tool helix angle	18°
	Shaving tool R.P.M.	252
	Surface speed F.P.M.	231
	Shaving time	**40 seconds**



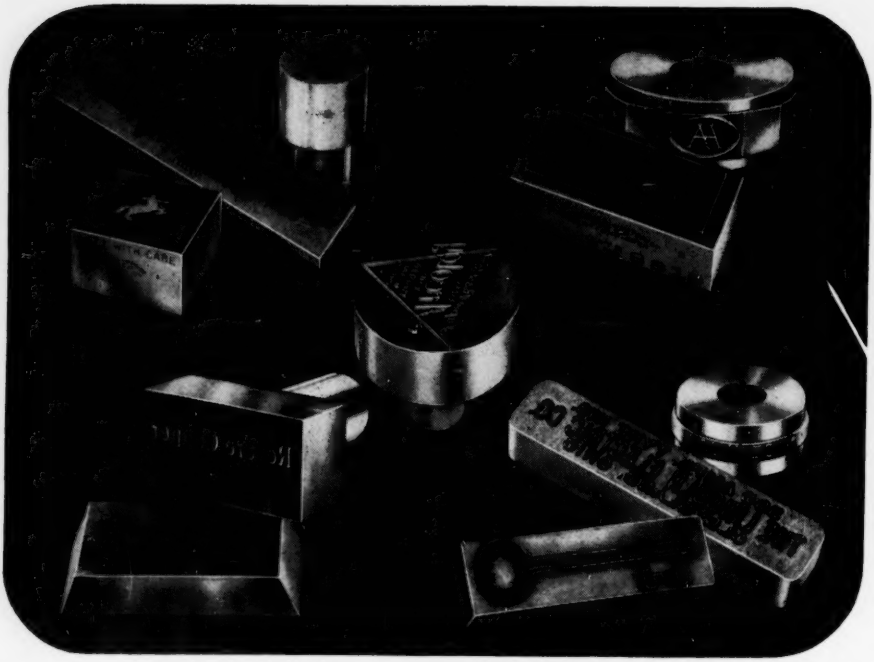
FELLOWS SHAVED...by eight #4 Gear Shavers



FELLOWS CHECKED...by four 8M Red Liners

GEAR SHAPER COMPANY

Head Office & Export Department: 78 River Street, Springfield, Vermont.
Branch Offices: 323 Fisher Building, Detroit 2 • 5835 West North Ave., Chicago 39
2206 Empire State Building, New York 1.



NOBLEWEST PRECISION MARKING DIES

for

MARKING
GRADUATING
NUMBERING
KNURLING
EMBOSSING
DEBOSSING

Noblewest makes dies for marking practically every type of surface, including round, flat, concave, convex and irregular contours. Noblewest dies are the finest that human skill and modern facilities can produce—*yet they are competitively priced.* Noblewest uses only specially selected steel, precision engraved to extremely close tolerances, and heat treated for extra long wear. Every Noblewest die is rigidly inspected and Rockwell tested for hardness. Large facilities permit prompt delivery. Send detailed specifications and we will gladly submit quotations. The Noble & Westbrook Mfg. Co., 25 Westbrook Street, East Hartford 8, Conn.

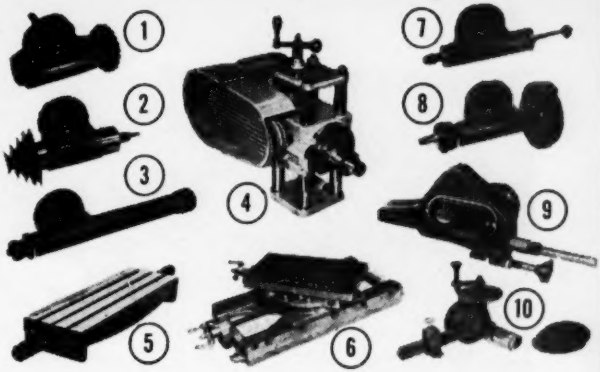
MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

master
MACHINE TOOL ATTACHMENTS

for
LATHES
TURRETS
MILLS

OR USE INDEPENDENTLY



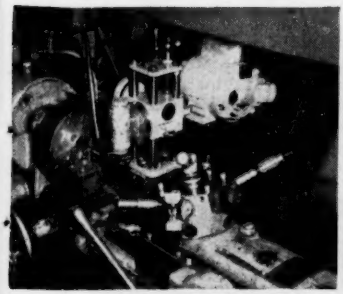
1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

THREE SIZES

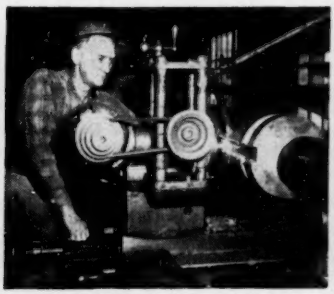
MODEL "C," ⅓ hp — 9" to 13" Lathes
MODEL "B," ½ or ¾ hp — 13" to 18" LATHES
Model "M," 1 to 3 hp — 18" to 72" LATHES

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

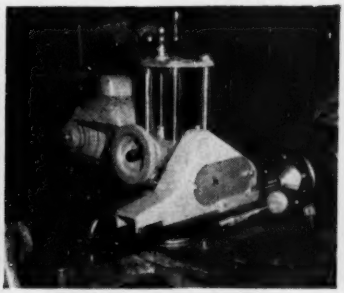
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

FREE

WRITE FOR NEW ILLUSTRATED 24-PAGE CATALOG

MASTER MANUFACTURING CO.

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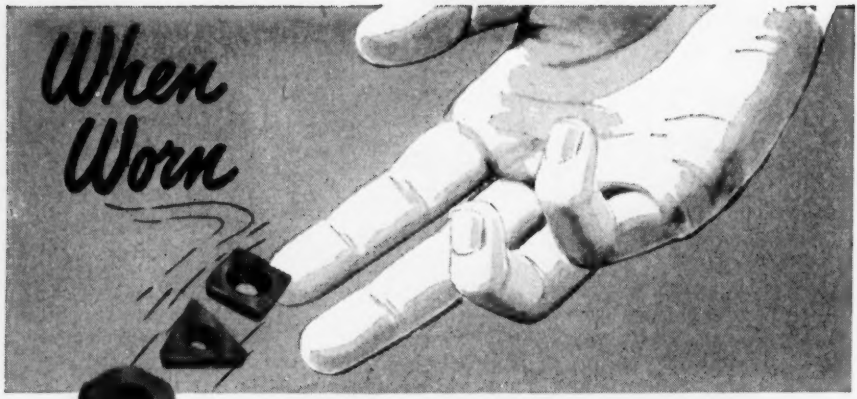
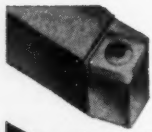


THROW THEM AWAY ... and Save Money



Style 12SKD

Style 6RKD

Style 6TKD

Regrinding of carbide tools—even the best—consumes time and money. It can be a major item in over-all tooling costs. But—there's a way to eliminate this expense entirely on many jobs. Here's how.

The "Kendex" tool needs no regrinding! It has an indexable insert that can be discarded when all its multiple cutting edges become dull.

By the time replacement is required (at slight cost compared to that of regrinds), the insert has already paid for itself by increased productivity, and to discard it is economical practice.

Kendex tools are available in three styles—with round, square, or triangular inserts—as illustrated, and in a range of shank sizes—½" to 1" square.

Perhaps you have jobs on which standard Kendex tools will be suitable—or you may be able to use the standard inserts in conjunction with present tooling. If you desire, one of our Tool Engineers will be glad to assist in working out suitable applications of the "Kendex"* principle to your specific machining problems. Kennametal Inc., Latrobe, Pa.

*KENDEX®

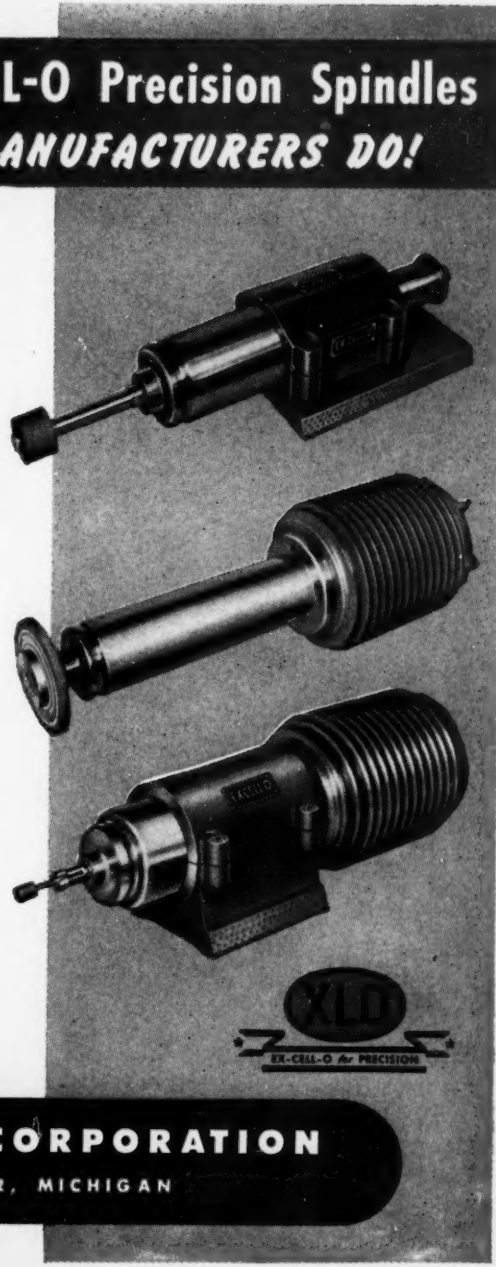
KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

Specify EX-CELL-O Precision Spindles
GRINDER MANUFACTURERS DO!

You can insure the accuracy of your grinding equipment as many grinder manufacturers do—by standardizing on Ex-Cell-O Precision Spindles. Prominent machine tool builders install Ex-Cell-O Spindles as original equipment on internal grinders, universal grinders, surface grinders, gear grinders, tool and cutter grinders and special-purpose grinders.

Select the grinding spindles you need from the big Ex-Cell-O Spindle Catalog. If you don't have a copy write for one today on your company letterhead. There is no obligation, of course.



EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

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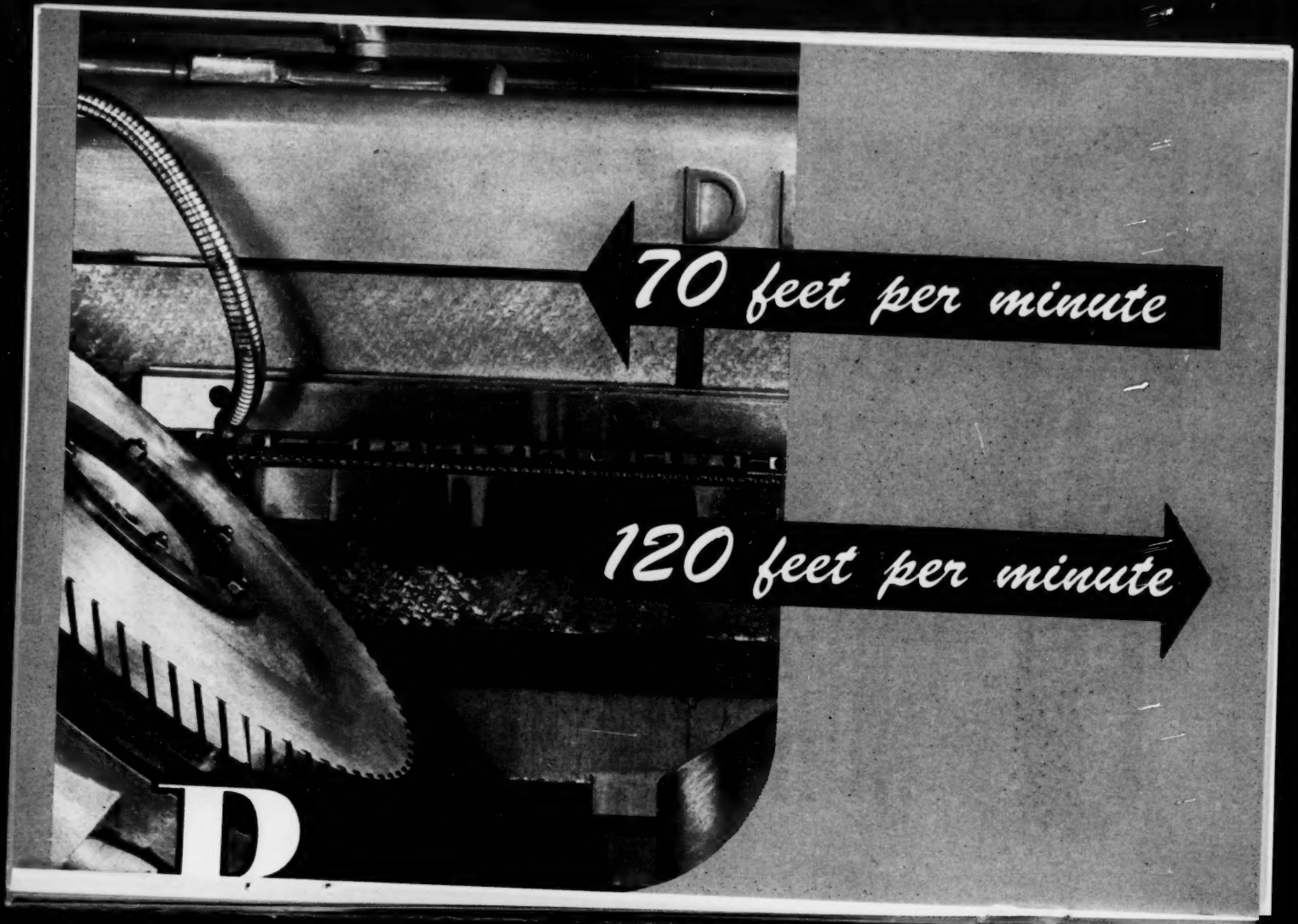
70 feet per minute
120 feet per minute

Broaching compressor wheel slots

Broaching intricately formed slots in aluminum compressor wheels at a speed of 70 feet per minute — with a return stroke of 120 feet per minute — is a practical reality at Detroit Broach. This great broaching advancement is the result of imagination and sound broach-engineering experience . . . a combination forged by years of creative engineering and manufacturing of broaches and broaching tools exclusively.

Whether your application involves a new concept in broaching or the simplest type of conventional broaching, these same factors will benefit you in terms of broaching economy and dependable tooling when you call on Detroit Broach.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY

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FASTER FINISHING

at less cost!

CP Hicycle Portable Electric Tools for grinding, sanding, buffing and polishing not only finish products faster but they increase man-hour productivity — and at far less cost! Lightweight CP Hicycle tools operate under constant speed — there's no sag under full load. Hicycle induction motor and rugged design assure low-cost power and long service life with minimum maintenance . . . has a solid rotor, no armature to burn out . . . no commutator or brushes to replace. Write for details. Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.

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SUPREME CHUCKS

meet high quality engineering standards

Qualities Like These Give You Lasting Service

JAWS: Nickel chrome moly alloy steel . . . expertly heat treated for durability.

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ENTIRE CHUCK BODY: Hardened inside and out.

KEY HOLES: Do not extend completely into body cavity.

Every SUPREME Brand CHUCK is individually tested before leaving the factory to assure accuracy and quality. The result is a precision tool that helps produce better workmanship and a long lasting tool for greater economy. SUPREME Chucks are interchangeable with other makes. When you order them you have made a quality buy . . . an economical buy.

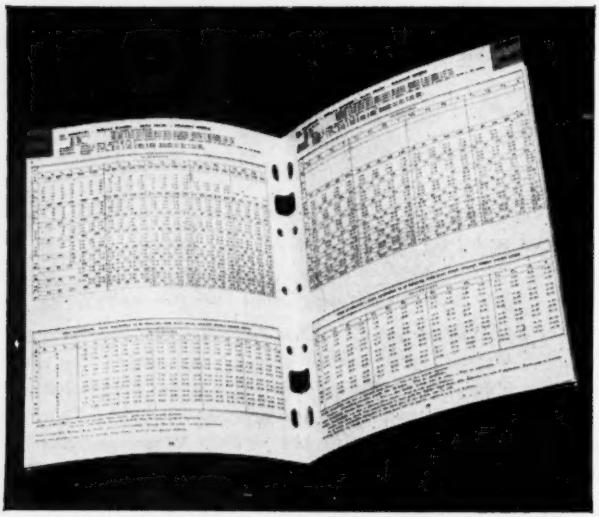
SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

FIRST SIMPLIFIED PRICING IN GRINDING WHEEL HISTORY

CARBORUNDUM's New "Quick-Finding" Reference Replaces Traditional Complex Time-Wasting System



114 Page Pricing System Now Simplified to 32 Pages

CARBORUNDUM has achieved *simplification* with this new basic pricing system: previous information requiring 114 pages covering list prices, discounts, etc., has been reduced to only 32 pages.

You can now order your grinding wheels from CARBORUNDUM with a speed and accuracy hitherto impossible. Practically everything you want to know about prices, ordering quantities, discounts on any one wheel will be found on one page—arranged for quick, easy finding.

CARBORUNDUM® has taken the mystery out of buying industrial grinding wheels...by adopting the first really simplified basic price system in the history of the industry. Now you can determine prices, ordering quantities and discounts for a given wheel, almost without exception, by checking a single page of this new book.

You no longer have to refer to several pages to determine prices and discounts, nor follow complicated rules, nor apply chain discounts, nor worry about decimal multipliers. Even the special price additions covering various shapes have been eliminated. Basic prices are shown for all straight wheels *and* special wheels such as dishes, saucers, flaring cups, special faces, cones, plugs, and many others.

Practically all the wheels you use can be priced with a single discount under this new system, thus further simplifying your paper work and minimizing errors.

Coincidental with the adoption of this basic pricing system, some price adjustments have been made. Prices of certain lines of wheels are reduced, others are slightly higher.

"A Boon to Every Customer and To Us," is Distributor Concensus

First copies of this new pricing system off the press went to several hundred Industrial Distributors of CARBORUNDUM's grinding wheel lines. The many letters of response have been highly enthusiastic. Here are typical comments:

"This is, without a doubt, the finest simplified pricing system I have ever seen. We want to compliment you on this progressive step."

"Heartiest congratulations—the new net pricing schedules are swell! It would do your heart good to see the gratitude with which these prices were received by the boys in our organization. I feel that you men who devoted so much time to getting out this pricing structure should know how we feel. This is a real contribution to Industrial Distributors—and to industrial purchasing agents."

"Next to standardization of gradings, your new price book is probably the most progressive step that has been taken in simplifying the marketing of abrasives. With this new basic pricing plan practically all the complications have been removed. We know it will have enthusiastic reception."

"Carborundum has taken a forward step that should pay off in the future. After trying a few examples in pricing, it looks as though price clerks and purchasing people will have a much easier time arriving at net prices than heretofore."

The success of this new simplified pricing plan was foreordained, because twelve of the nation's top industrial supply men helped put the system together. This group, known as CARBORUNDUM's *Distributor Advisory Board, was of material assistance to* CARBORUNDUM's *sales management on this key project.*

HOW IT SAVES TIME...Cuts Errors

Reducing the number of pricing pages from 114 to 32 gives you only part of the picture of how CARBORUNDUM's new system speeds and simplifies the pricing of grinding wheels. It actually cuts down the number of steps required to compute a price—and best of all, it concentrates those steps within the confines of a single page.

As an example, consider the steps—and separate page references—previously required to find the price of cup wheels: 1) Look up the page showing the list price... 2) Look up the page showing list price additions... 3) Look up the page showing the standard ordering quantity schedule, to determine quantity for discounting purposes ... 4) Look up the page showing product discount... 5) Look up the page showing quantity discount.

All this information, previously appearing in five different places in the price schedule, is now found on a single ready-reference page. No wonder pricing now takes far less time, with far fewer chances for error.

For when you have to flip pages back and forth, sometimes losing your place, often doing involved calculations, not only do you waste valuable time, but errors are bound to creep in—errors that are even more costly than the high cost of lost time. This new simplified "all-on-one-page" system was designed to be error-proof; thorough tests by grinding wheel users prove that it actually promotes a high degree of accuracy—thus makes doubly valuable the savings in time it gives you.

Simplified Pricing to be Extended to Other Abrasive Lines

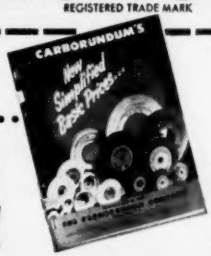
The new basic pricing system will soon be applied to additional abrasive lines by CARBORUNDUM. Segments, Disc Wheels, Mounted Wheels and Points, "MX" Wheels, and other bonded products will shortly be covered by new simplified basic price lists.

THE CARBORUNDUM COMPANY

REGISTERED TRADE MARK

Your copy is waiting for you...

MAIL COUPON NOW...TODAY!



THE CARBORUNDUM COMPANY, Dept. MM 81-317
Niagara Falls, New York

Please send me my copy of "New Simplified Basic Prices of Grinding Wheels."

NAME

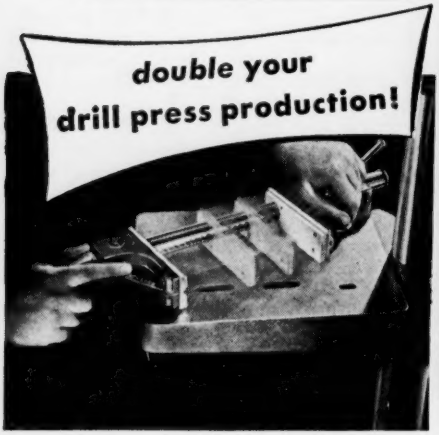
COMPANY

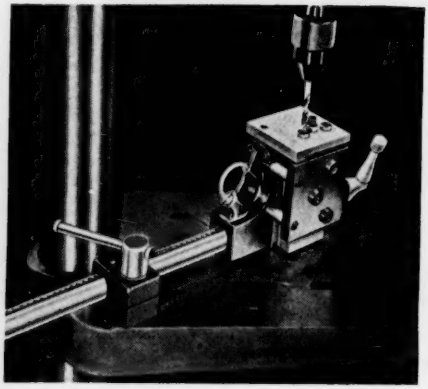
STREET AND NUMBER

CITY ZONE STATE

81-317

NEW AMF Float-Lock Instant-Change Safety Vise





IDEAL BASE FOR DRILL JIGS

Retaining its full-floating and locking features, but otherwise completely redesigned, the new AMF Float-Lock *Instant-Change* Safety Vise is faster, huskier, greater in capacity (9" and 12" jaw openings)... the most versatile, most economical work holder yet devised for drill presses!

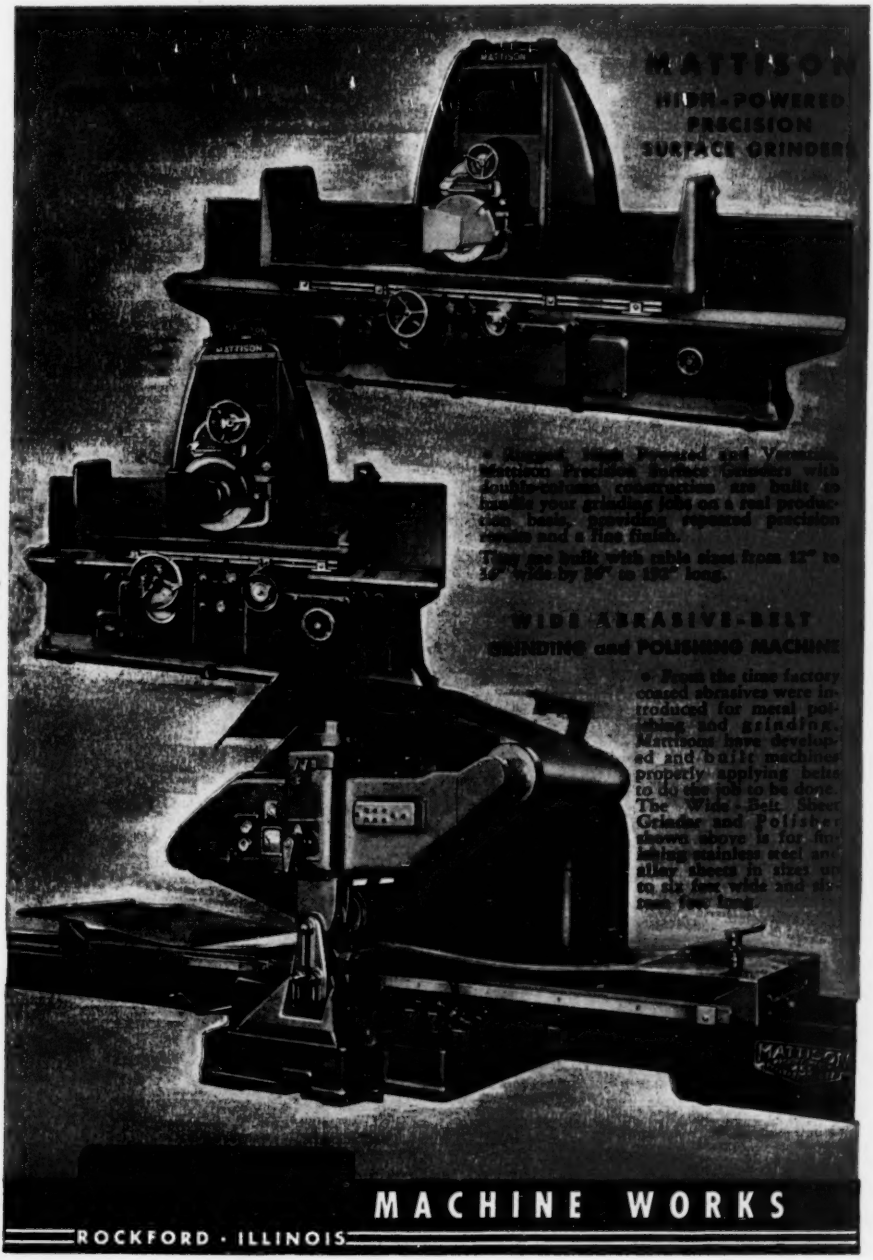
New ratchet-locking jaw slides *instantly* to desired opening. The other, screw-operated jaw positively locks—or completely releases—work with a mere flick (about ¼-turn) of the handle.

Vise turns over readily on three sides, permits extensive drilling without removing work. Horizontal and vertical "V" grooves align and grip rounds for end drilling, centering... ideal for angle drilling. Vise serves as low-cost drill jig when locked anywhere on the table... swings out of the way when not needed. Saves so much set-up time, compared with usual work-holding devices, that good operators should easily be able to double their production!

Contact your local AMF Float-Lock distributor for a demonstration. Or write for his name and address and a copy of new, descriptive Folder WF 53-1(a). Wahlstrom Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Ave., New York 17, N. Y.

amf Float-LOCK instant-change SAFETY VISES

MODELS ALSO AVAILABLE FOR BAND SAWS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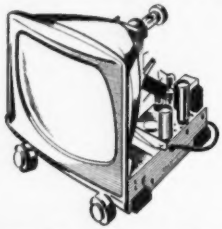
HIGH-POWERED
PRECISION
SURFACE GRINDERS
WIDE ABRASIVE-BELT
GRINDING and POLISHING MACHINE
MATTISON
MACHINE WORKS
ROCKFORD · ILLINOIS

UNBRAKO SELF-LOCKING SOCKET SET SCREWS feature the following advantages: knurled cup point that won't work loose; accurate hex socket for nonslip, positive drive; fully formed threads—Class 3 fit; heat treated alloy steel for strength; standard sizes—#4 to 1"—in a full range of lengths.



USE UNBRAKO.s wherever ordinary cup point set screws are used. On radios, television sets and electronic equipment.

On refrigerators, washing machines, and other household appliances.

9 times out of 10
a standard UNBRAKO will do the job

A special socket screw may not be necessary, a standard UNBRAKO usually does the same job —much cheaper. Your local industrial distributor stocks Standards. He gives immediate attention to your requirements, and such extras as special delivery to your plant. Write for UNBRAKO Standards. SPS, Jenkintown 22, Pa.

UNBRAKO® SOCKET SCREW DIVISION

SPS
JENKINTOWN PENNSYLVANIA

On power mowers, power saws and other power tools.

UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

for Enlarging Holes in Metals

Frequently it is necessary to enlarge holes in castings, steel forgings or punched metals. Hercules High Speed Three and Four Flute Core Drills are specifically designed and heat treated to proper hardness for efficiently enlarging cored, drilled or punched holes. Taper shank core drills are available in diameters from ¼" to 3" and straight shank core drills from ¼" to 2" diameters.

Just off the presses is a new catalog covering the complete W & B line of Drills, Reamers, Countersinks, Counterbores, Carbide Tools, Tool Bits and Special Tools. Write today on your letterhead for your free copy of this attractive and extremely usable tool catalog.

W&B

Contact Your Local W & B Distributor

"Makers of Fine Tools Since 1845"

WHITMAN & BARNES

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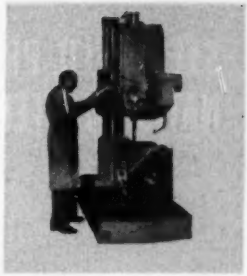
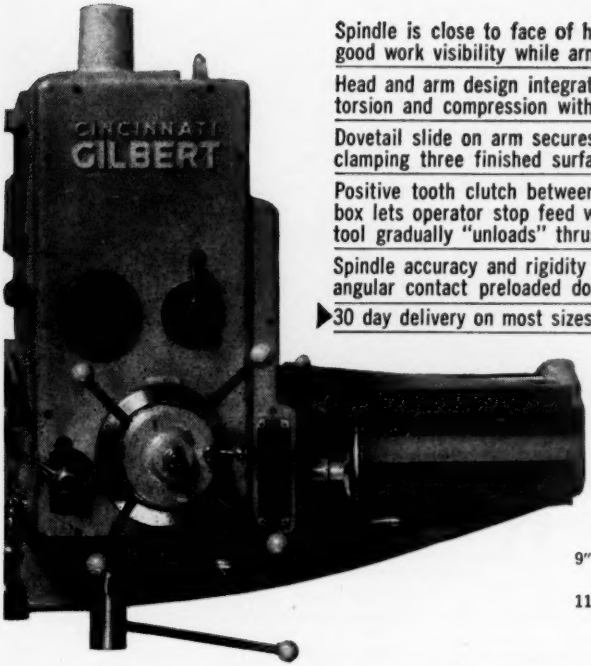
MOVES FAST: STAYS PUT





Spindle is close to face of head, provides good work visibility while arm is low.

Head and arm design integrated to withstand torsion and compression with very low deflection.

Dovetail slide on arm secures head by clamping three finished surfaces together.

Positive tooth clutch between feed worm and gear box lets operator stop feed while spindle turns and tool gradually "unloads" thrust normally absorbed by arm.

Spindle accuracy and rigidity insured by four angular contact preloaded double zero ball bearings.

▶30 day delivery on most sizes.

9" columns . . . 3' and 4' arms

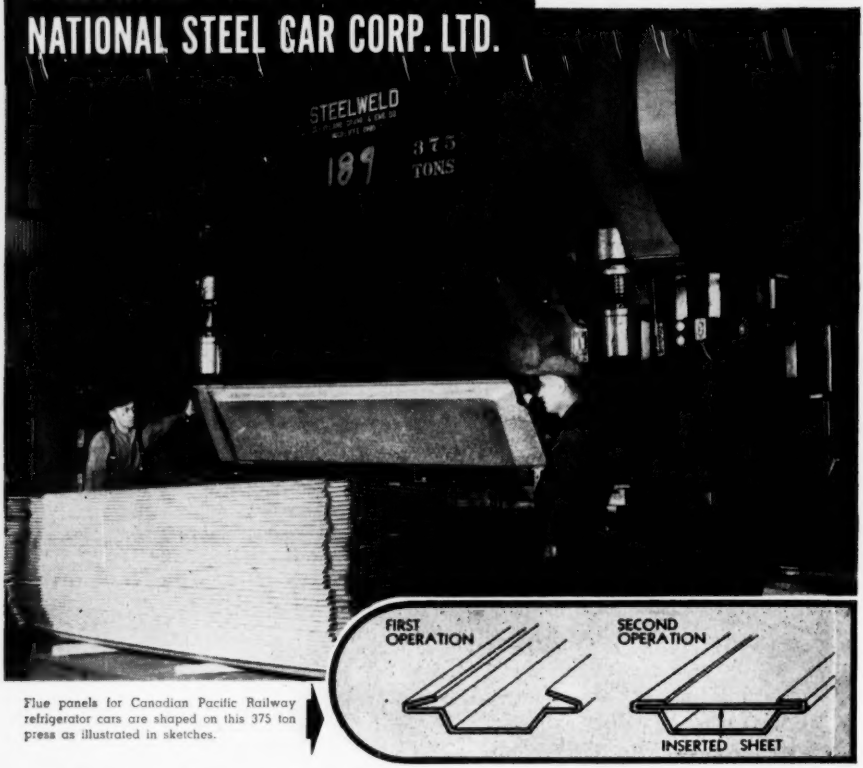
11" columns . . . 3', 4', and 5' arms

Fast response to all controls with minimum effort, plus positive "no-drift" clamping, make it easy for Cincinnati Gilbert operators to get more work done accurately and on time. No one detail is responsible: it's the combination of "clean" design and rugged construction that makes Gilbert consistently pay high returns on your investment. 9" and 11" columns. Ask our representative why "those who buy Gilbert buy Gilbert again."

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO

STEELWELD PRESSES SERVE NATIONAL STEEL CAR CORP. LTD.



Flue panels for Canadian Pacific Railway refrigerator cars are shaped on this 375 ton press as illustrated in sketches.

Two Steelweld Presses installed in 1937 and 1941, at National Steel Car Corporation, Limited, Hamilton, Canada are operated continuously for various forming and punching operations on metal from 18 gauge to ½ inch.

As this company is a large builder of cars for railroads all over the world, there is an endless variety of work for the presses to perform. The flanging operations on the ventilating panels shown above are typical.

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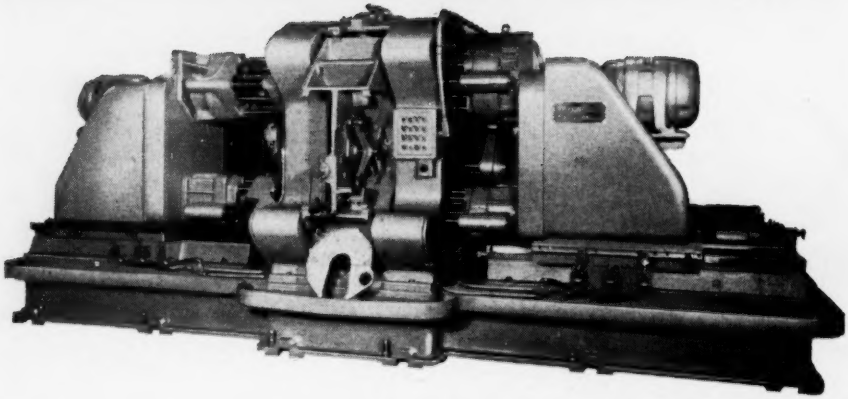

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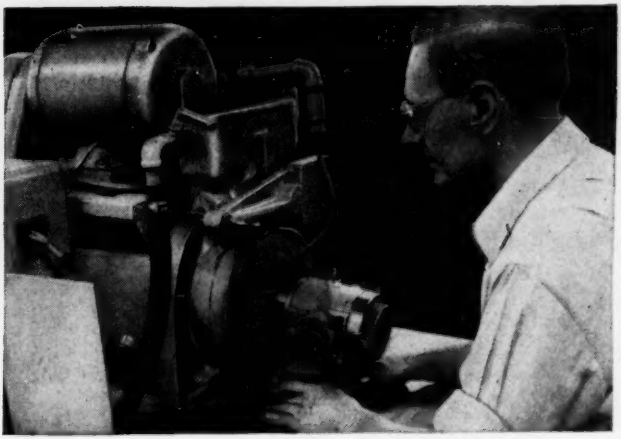

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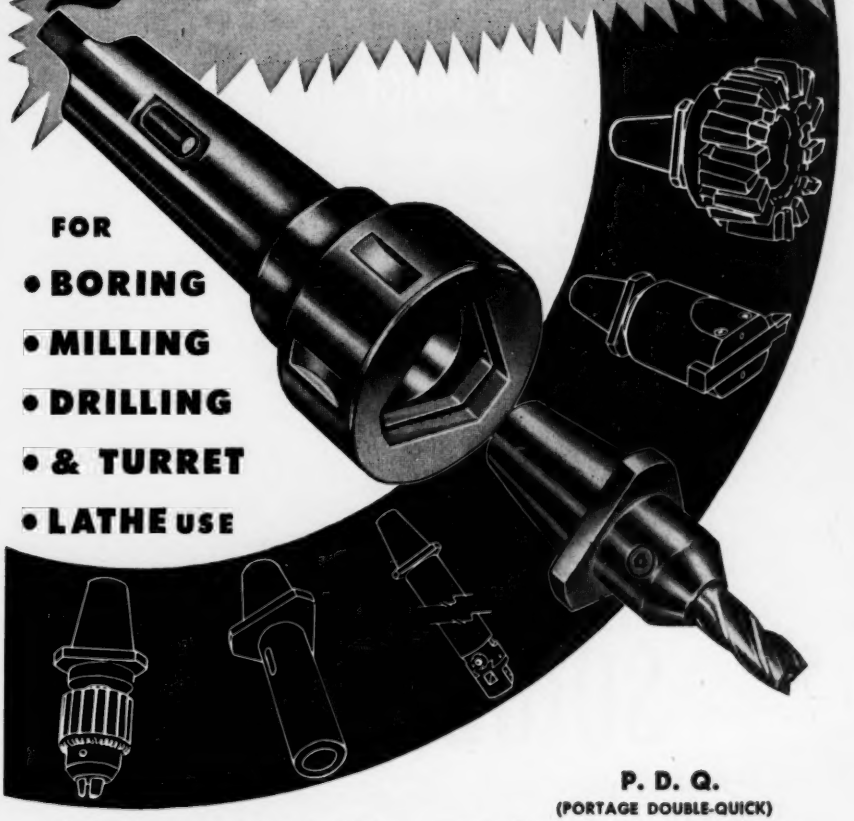

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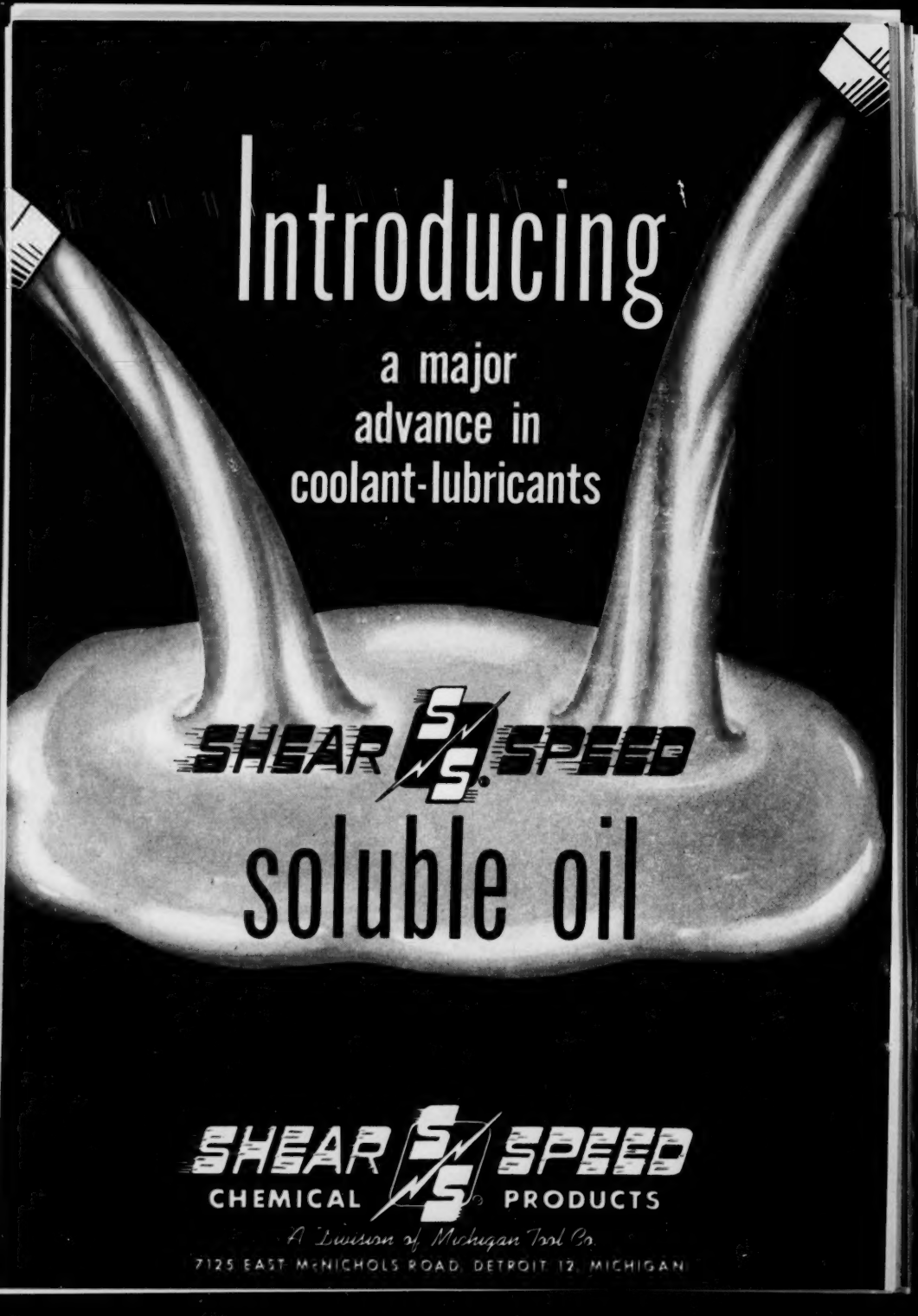
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THE PRESS THAT WORKED ITSELF *INTO* A JOB!

This KRW 150-ton motor-driven Hydraulic Press works all day—every day—testing dies made by Phinney Tool & Die Co., Medina, N.Y. Some of these dies are small enough to fit in the palm of your hand; others weigh up to thousands of pounds.

Phinney had one interesting experience that demonstrates the amazing versatility of this Press. They received an order for a series of 4 progressive dies from a maker of tank parts. Phinney made the dies, tested them, and shipped them. A short time later the dies came back. They were excellent, but the customer didn't have a press large enough to run them. Would Phinney put the dies in production on the same Press that made the sample parts? Phinney accepted. And this same KRW Hydraulic Press has since turned out thousands of tank parts in addition to its regular work of testing dies.

You'll find the versatility and rugged construction of KRW Hydraulic Presses can save you time and money on many operations in your shop. 25-150 ton capacities; one, two or three cylinders; hand, air or motor driven. Write us for complete specifications and prices. Dep't. 16.

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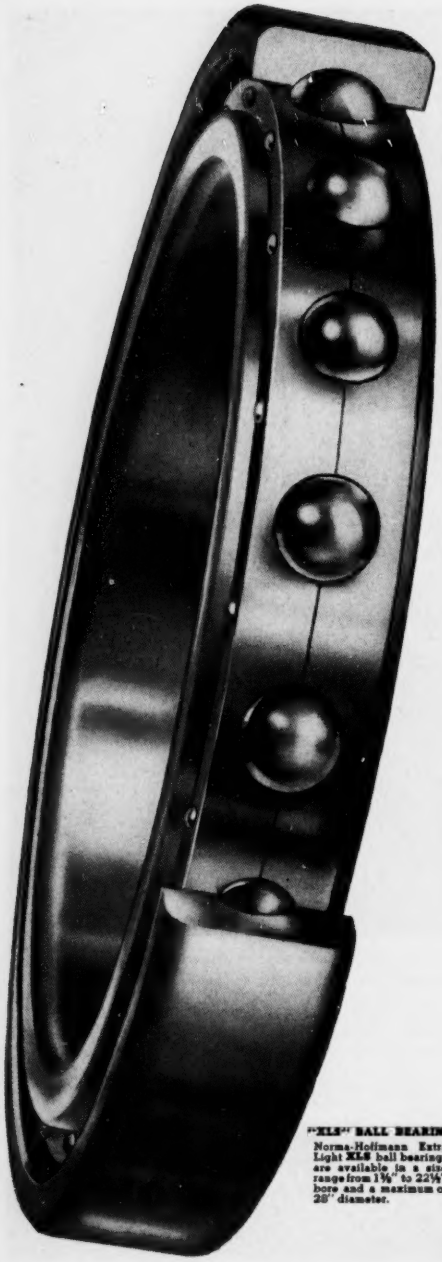

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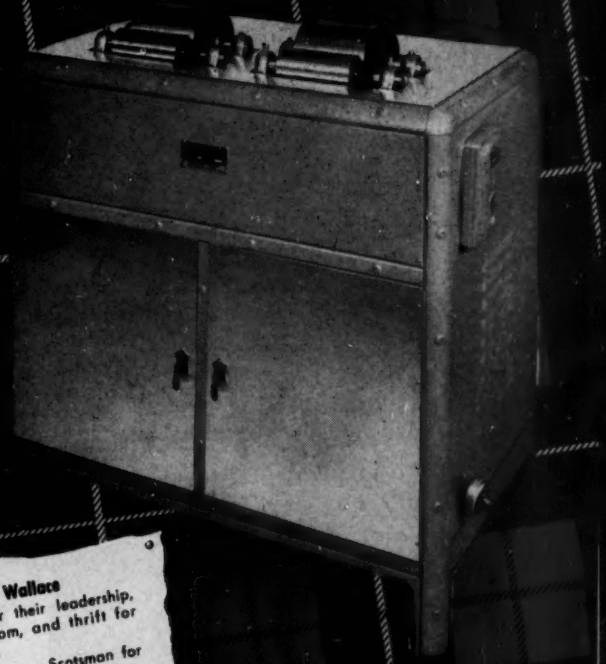

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A useful reference list for Purchasing and Engineering departments. Helpful ordering information and up-to-date listing of popular style collets for all makes of lathes and millers. Shows major dimensions; maximum capacity for round, square and hexagon; collet adaptations for nose type chucks; stocking locations; how to order and prices.

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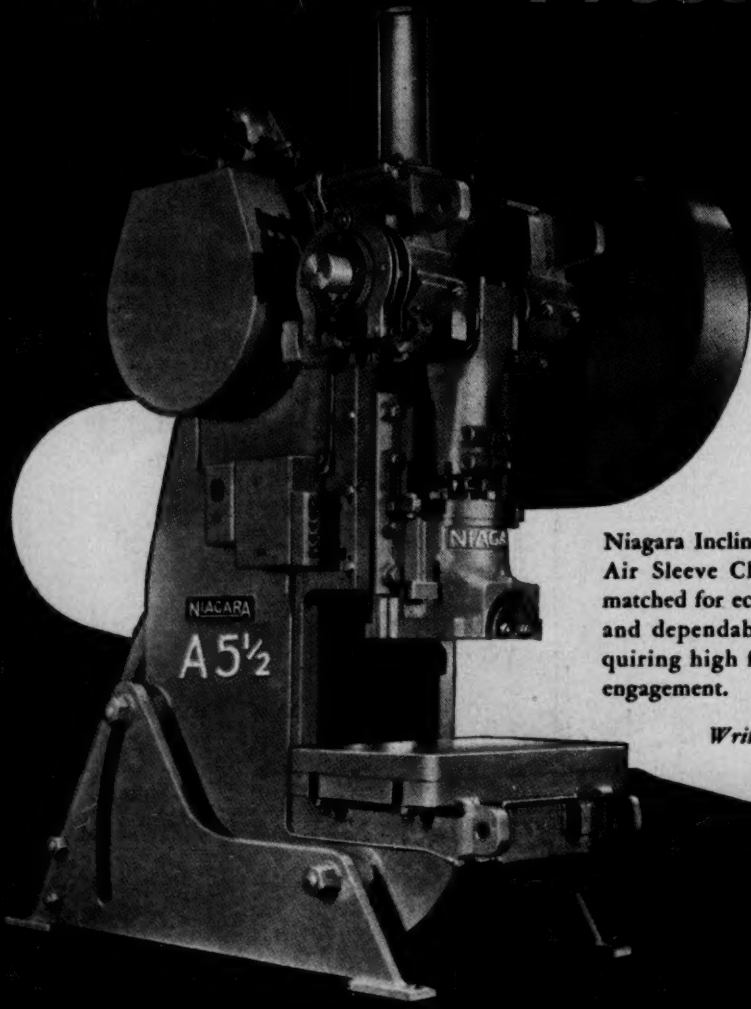
NIAGARA Inclinable Presses



Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

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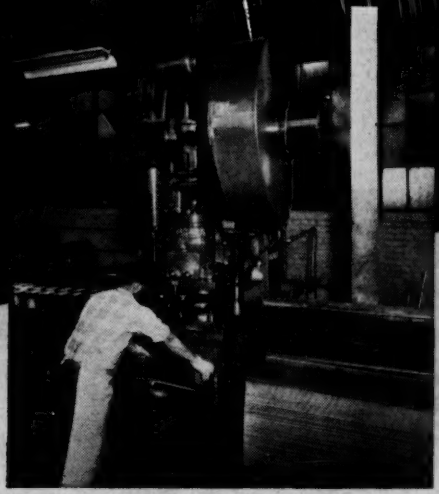
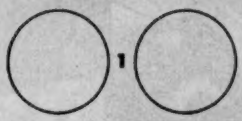
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

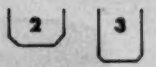
On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT

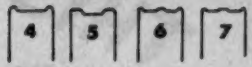




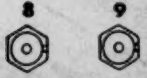
1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.



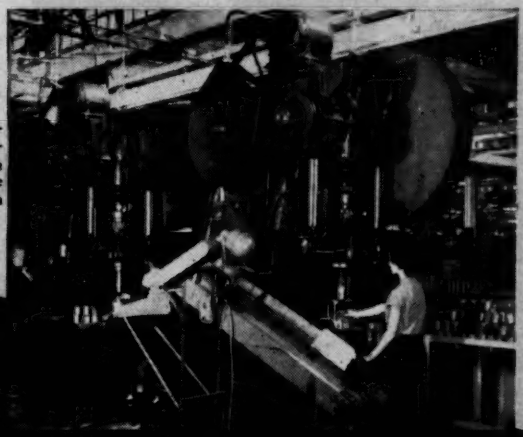
2, 3. Cupping and Redrawing on A-5½ Presses with Air Sleeve Clutches.



4, 5, 6, 7. Indenting end on A-3½ Presses.



8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

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America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

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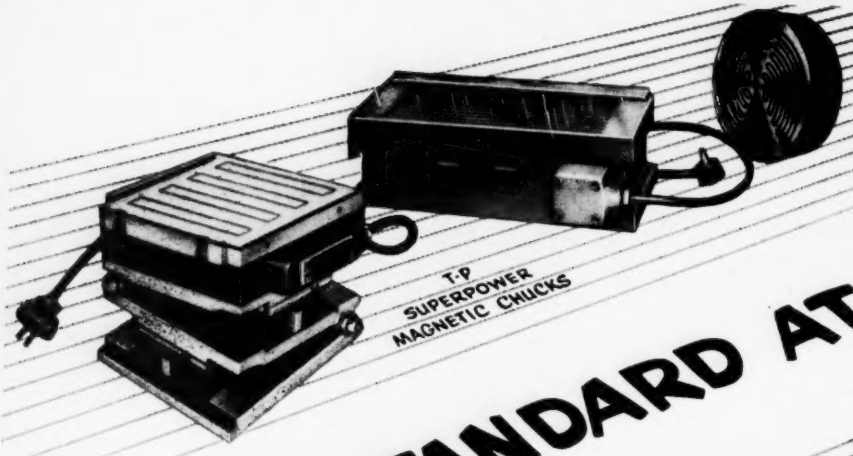

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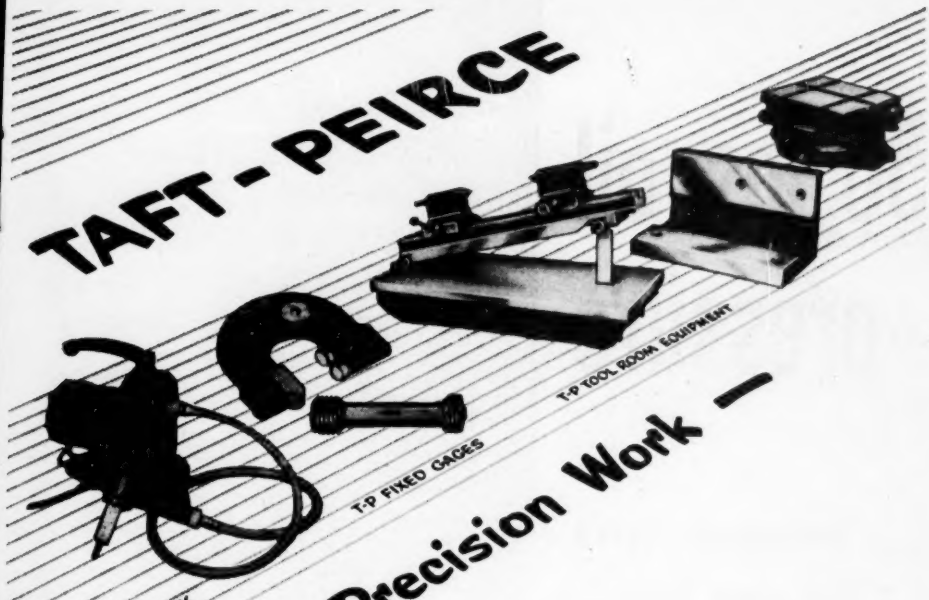

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IS NECESSARY WITH A CUT LIKE THIS...

This tremendous cut demonstrates the extra strength, rigidity, and power in Cincinnati Shapers. It also demonstrates the ability of the 50 p.s.i. lubrication system to develop and maintain oil films under the heaviest loads.

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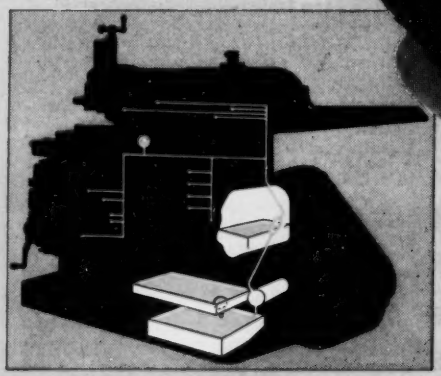
Demonstration cut.
Actual size steel chip, 2" cut .030" feed Cincinnati 24" H.D. Shaper.



50 p.s.i. system includes 50 micro filter, settling basin and reservoir. Transmission runs submerged in oil.

The Electro-Magnetic Brake and Clutch, with finger tip control, is a Cincinnati feature for speed and ease of operation.

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APEX DRIVERS
Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Female square drives: ¼" to 1".

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Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Hexagon shank sizes: ¼", 5/16", 7/16", 5/8".

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Male hex sizes to fit #5 to ¾" socket head cap screws; #5 to ½" socket head set screws. Used with Apex bit holders, available for all popular makes of air, electric and spiral drivers.

You can save hours of production time—and dollars in production costs—using Apex tools to drive socket head screws and bolts. Use Apex drivers, power bits or bit holder and insert bit combinations with your power tools to eliminate expensive, time-consuming manual effort. These Apex tools, designed to do a specific job faster and more efficiently, can help increase your productive output.

For complete information, write (on your company letterhead, please) for Catalog 29 (Apex Drivers) or Catalog 21 (Apex Power Bits and Insert Bits).

APEX TOOLS

power bits, bit holders and insert bits

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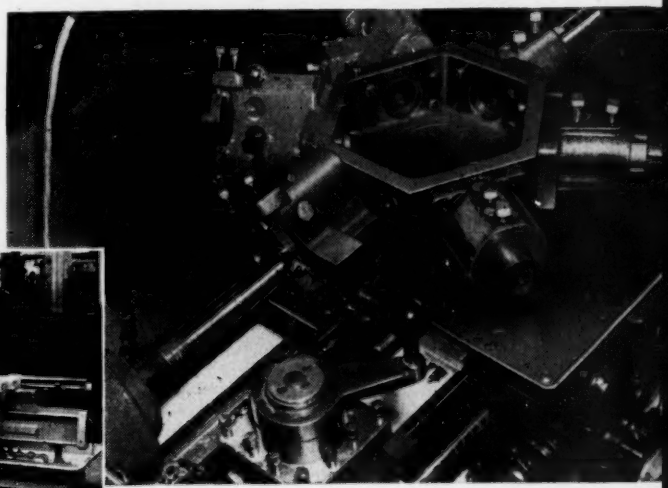
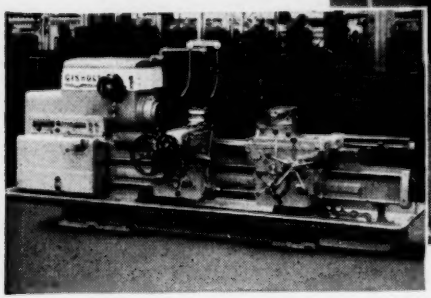
take shaft jobs Like This:

they take less time on

GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

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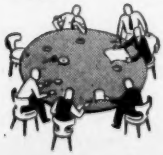
THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*



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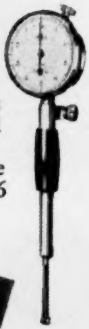
Ames Dial Depth Gauge No. 11C

Ames Dial Micrometer No. 517

Ames Amplifying Dial Comparator No. 26



Ames Small Hole Gauge No. 36

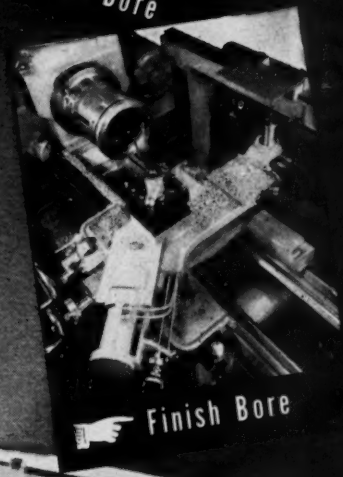
Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *29 Ames Street Waltham 54, Mass.*

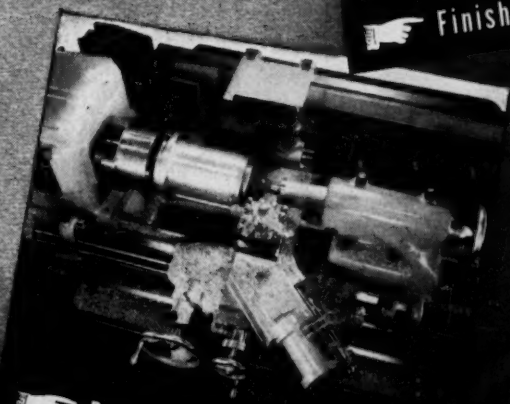
Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

a fraction of their former cost!

Rough Bore



Finish Bore



Rough and Finish Turn

Total floor to floor time for Duplicating Lathe operations 52 minutes

The technique and production time used in this test were taken from actual performance in two of the nation's leading railroad shops.

A complete time study including all pertinent data is available upon request.

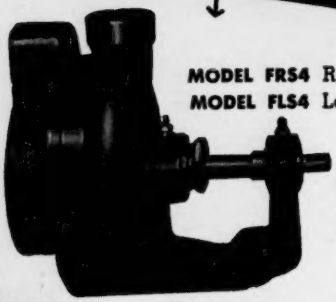
This is only one of the Diesel engine component jobs that "American" Hydraulic Duplicating Lathes are performing at record low cost in many of our leading railroad shops. Never has the need for economies in railroad operation been more urgent. Never has there been a better opportunity for effecting economies in the railroad shop than offered by the "American" Hydraulic Duplicating Lathe.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

TRADE MARK
"FULFLO"
REG U S PAT OFF

MAKE SURE YOUR
COOLANTS HIT THE RIGHT SPOT
TO KEEP TOOLS COOL

CENTRIFUGAL COOLANT PUMPS



MODEL FRS4 Right rotation
MODEL FLS4 Left rotation

Direct connection;
1800 to 2400 rpm; 35 gal. at 1725 rpm; 20-ft. head; also with pulley for belt drive, if desired.

WHETHER you need a drop or two or a constant stream, FULFLO pumps and circulates the coolant fluid *just where* and *when* it will do the most good.

FULFLO COOLANT PUMPS prolong the life of your tools when production demands so much and tools must do *more* work *longer*. And especially when replacements are expensive or impossible.

Ask the FULFLO engineers what type will do your job best.

Write on your letterhead for professional edition of
FULFLO MECHANICAL DATA BOOK

TRADE MARK
FULFLO
REG U S PAT OFF

THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

Beaver BLADE-SETTING AND INSPECTION FIXTURES GIVE FASTER, MORE ACCURATE JOBS . . . CUT COSTS IN HALF!

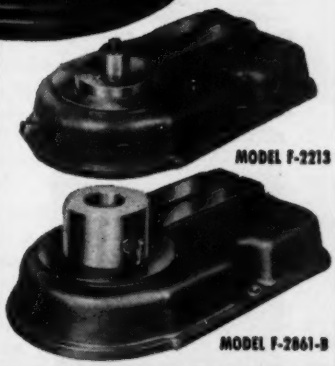
Adjustable setting-post assembly, (No. F-2861-A), instantly and accurately positions each blade.

This is an F-2861-B fixture with No. 50 NMTB taper spindle and adaptor, equipped with setting-post assembly.

A convenient spindle-lock located on the right side of the spindle, holds the work in any desired position.

Accurate and frictionless spindle takes any tool with No. 50 NMTB taper shank or any style cutter with No. 50 NMTB adaptor.

BEAVER blade-setting fixtures take ALL the guesswork out of blade resetting. These fixtures are also ideal for checking the accuracy of any type cutter or tool after grinding. With the aid of a Beaver blade-setting fixture, the grinding and resetting operation takes about one-half the usual time required. Anyone familiar with milling cutters can do an expert job without long experience. Available in two types—No. F-2213 with solid spindle and adaptor bushings or No. F-2861-B with 50 NMTB Taper spindle mounted in precision anti-friction bearings.



MODEL F-2213

MODEL F-2861-B

See our Catalog 52 for cost reducing Beaver Tools

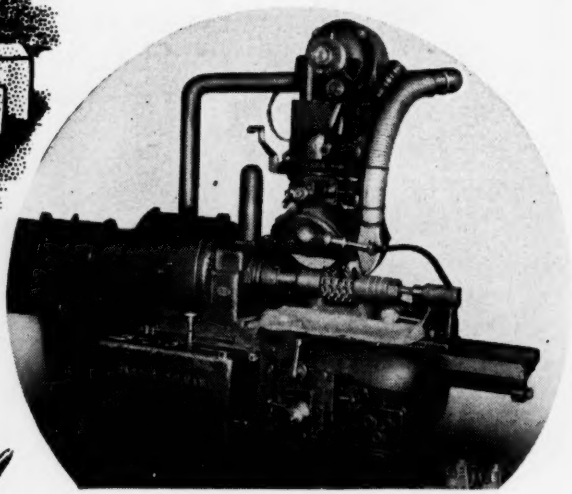
Beaver TOOL AND ENGINEERING CORPORATION

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICH. Teletype - Big Beaver 648

They Make Their Presence Felt

TORIT DUST COLLECTORS

Here is the hidden Torit Dust Collector. Compact and self-contained it fits easily into present and future production layouts. Available in sizes up to 5 H.P.



Completely hidden in unused space behind this hob grinder is a Torit Dust Collector, yet its presence is felt throughout the shop. The operator knows it's there because of the absence of irritating dusts. The inspector knows it because of fewer rejects. Even the front office feels its presence through higher production and better employee relations.

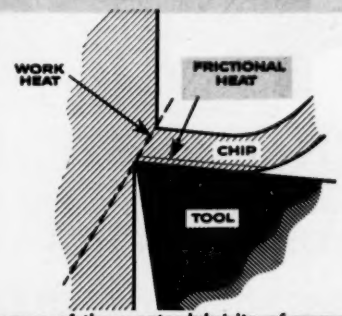
see our catalog in MACHINE TOOL CATALOGS or write for copy

Banish the spectre of bad working conditions. Equip all dust-creating machines with Torit Dust Collectors. Wide range of models and sizes. Low original and operating costs. For full information write:

TORIT MANUFACTURING CO.
296 Walnut Street St. Paul 2, Minn.

JOHNSON'S WAX-COOL CUTS 2 KINDS OF HEAT!

The only coolant that effectively attacks *frictional* heat as well as *work* heat

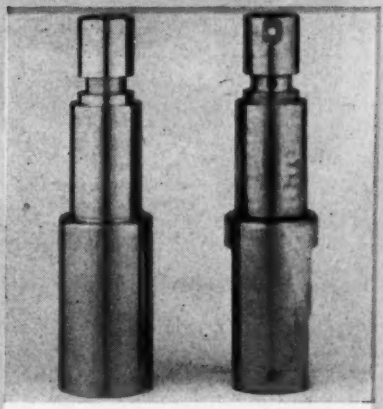


Because of the greater lubricity of wax and its polar attraction for metal, Wax-Cool is the first water-soluble coolant to greatly reduce *frictional* heat at the tool-chip interface . . . as well as check *work* heat generated in the shearing zone.

Wax-Cool has these advantages:

1. **WAX-COOL** stays with tools and material even under high heat and pressure.
2. **WAX-COOL** prevents chip weld because work runs cooler.
3. **WAX-COOL** effectively minimizes *frictional* heat, which is by far the principal source of heat.

Here is proof!



Parts of a stud driving gun (#4140 annealed alloy steel). Smooth finish at left resulted from Wax-Cool's greater lubricity. Poorly finished part shows results obtained from ordinary coolant.

Here are Wax-Cool's other benefits:

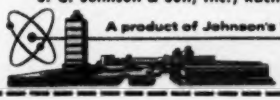
- **Tool life almost doubled.**
- **Finish feed stepped up from .004 per rev. to .007 per rev.**
- **Speed increased from 300 R.P.M. to 680 R.P.M.**
- **Eliminated problem of handling hot chips.**

A test is your best proof

In your own shop, Johnson's Wax-Cool can show you savings in tools and time plus performance standards you never believed possible. Call your local Johnson industrial distributor, or write to:

Ask about Wax-Cut—wax-type cutting *oil* for automatic screw machines, gear cutting machines, etc.
Ask about Wax-Draw—wax lubricant for drawing and forming all types of metals.

Industrial Products Department MMS-6
S. C. Johnson & Son, Inc., Racine, Wisconsin



Choose from 3 styles, 4 Sizes-

featuring tool box shelf Challenge Work Bench and steel drawer with lock.

CHALLENGE
Cast-Iron Top
WORK BENCHES

Whatever your work-handling requirements may be—there is a Challenge heavy-duty work bench to meet your needs. Every style has a durable 2" cast-iron top that will not warp, shrink, splinter or burn. All have leveling screws to insure a perfectly level and accurate surface. Legs are strong and solidly braced.

Challenge Work Bench with tool box shelf.

Challenge Work Bench without shelf or drawer.

TOP SIZES

28 x 48 x 2 (4 legs)	28 x 72 x 2 (6 legs)
28 x 60 x 2 (4 legs)	28 x 84 x 2 (6 legs)

SEMI-STEEL

LAYOUT SURFACE PLATE
for layout, inspection or assembly lines. Available either precision ground or planer finished. Special leveling screws. Sizes range from 12" x 18" to 54" x 144".

THE CHALLENGE MACHINERY COMPANY
Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN

Challenge
TRADE-MARK ®

731-R

Here's what the **SUNNEN** folks wrote us recently about their Sidney Lathes:

SUNNEN PRODUCTS COMPANY

Abrasive Service Equipment • Precision Honing Machines

7910 MANCHESTER AVENUE AT LOUIS 17, MISSOURI

Our 16" Sidney has proved to be everything Sidney said it would be.

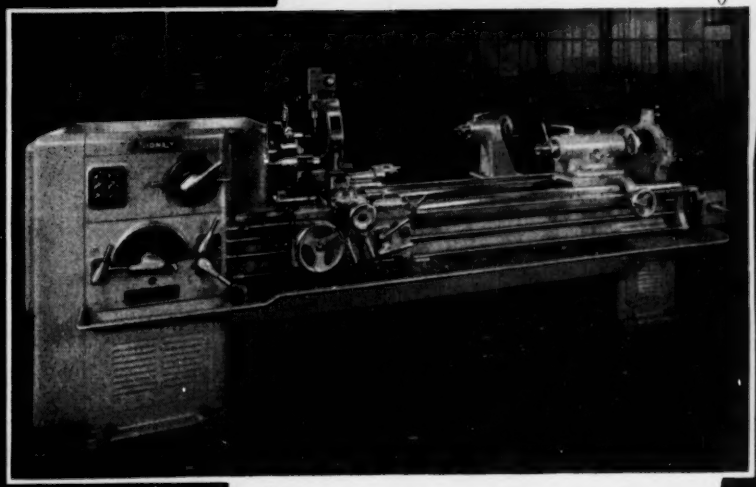
We have made many odd shaped dies and it will duplicate as accurately as a master part or template.

The Sidney is also easy to operate, the height is just right and all levers are conveniently located.

It is a real pleasure to operate a Sidney.

George Maschling
Tool Room Foreman

Cordially,
SUNNEN PRODUCTS COMPANY
Geo Maschling



SIDNEY FLUID TRACER LATHES

For you . . . as well as for Sunnen Products Company of St. Louis and scores of other leading makers of precision equipment . . . Sidney Lathes can do a terrific job . . . ECONOMICALLY!

The sensitive tracer head transfers every change in contour from any master piece or template to the cutting tool. A separate control switch turns off the tracer motor while the machine is performing standard lathe work.

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

LAMINA GUIDE PIN BUSHINGS

BRONZE PLATED ON HARDENED STEEL

...now in two styles

The bushing that gives you the long-wearing features of hardened steel yet provides the seize-free, score-free performance of soft bronze is now available in the two styles at the left.

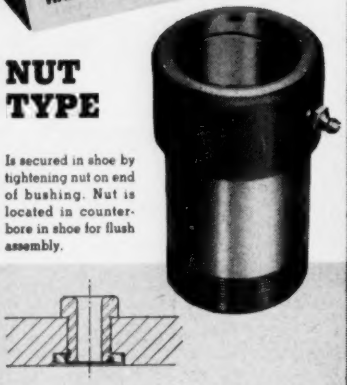
The Lamina Guide Bushing is hardened steel with free-running bronze electroplated on the inside diameter. A ½" oil groove further lubricates the inside of the bushing in a double figure-eight pattern. Ordinary grease is fed to the groove through a standard Alemite fitting.

In addition to the improved wearing qualities of the Guide Bushings, Lamina Guide Pins give longer service, too. Made of water-hardening tool steel, these pins eliminate the brinelling and "mushrooming" characteristic of case-hardened pins when driven into the die shoe.

Both styles of these bushings are stocked in a variety of lengths and diameter for straight, shoulder and removable pins. **Lamina Dies and Tools, Inc., 14025 W. Eleven Mile Road, Berkley, Michigan.**

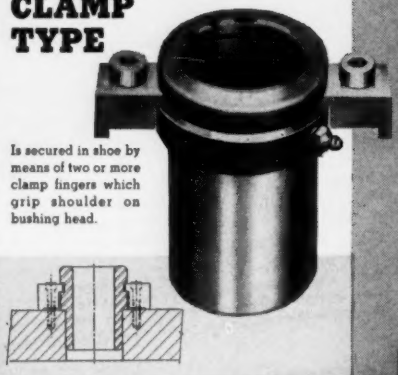
NUT TYPE

Is secured in shoe by tightening nut on end of bushing. Nut is located in counterbore in shoe for flush assembly.



CLAMP TYPE

Is secured in shoe by means of two or more clamp fingers which grip shoulder on bushing head.



This new brochure fully illustrates Lamina facilities, dies, tools and die making equipment. Send for your copy, there is no obligation.

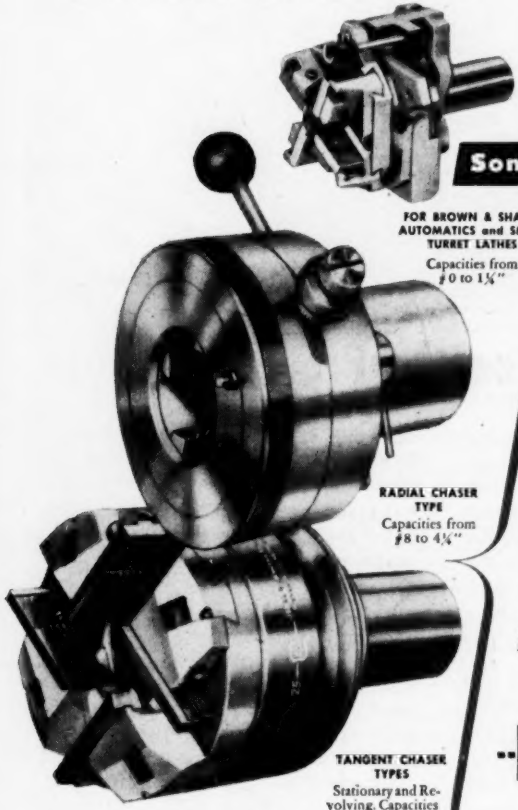
DISTRIBUTORS: A few desirable territories are open to qualified distributors. If interested, please write for details.

PATENT PENDING

Lamina DIES AND TOOLS

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.



FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.

Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO.,
521 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L DIE HEAD DIVISION

Tank Maneuver on the Production Front

A military contractor in Minnesota paid an outside firm $6 per wheel just to remove worn tires from tank track wheels. An alert management saw in the Dake 150-ton hydraulic platen press an opportunity for a smart, moneysaving operation.

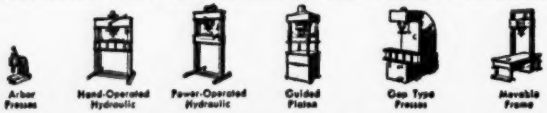
When the press had been installed, it brought these interesting results:

- **Two operations were combined into one—pressing the old tire off the wheel, and pressing the new one on in a single move.**
- **The removal-replacement job now costs only 15 minutes of an employee's time—compared to $6 per wheel for removal only as it was handled before.**
- **It saves the time lost in sending work out — avoids delays in the supplier's shop—helps get jobs delivered on time.**

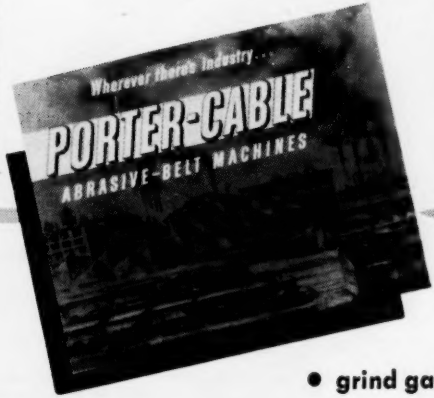
How about your production? It may very well be that a Dake Press will speed up work for you, too. Dake has a wide variety of hydraulic presses in its standard line . . . also stands ready to custom-engineer presses for jobs that standard models can't handle. It will pay you to consult your nearest Dake distributor.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.

DAKE PRESSES

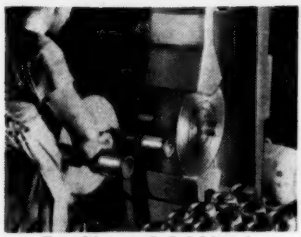


Send for this FREE BOOKLET TODAY...



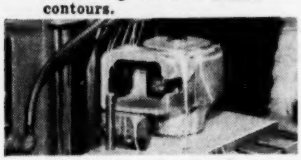
Shows how manufacturers use abrasive belt machining to...

- **grind ganged aluminum forgings**
- **finish-grind hardened steel bar**
- **deburr plastic without discoloring**
- **grind thin wall bronze casting**
- **bevel-grind corrugated metal**
- **centerless-grind carbon steel tubing**
- **bevel glass without chipping**
- **contour-grind sheet metal**



Roughing and finishing in one set-up.

Polishing hard-to-reach contours.



Machining rim surface 100% faster than milling.

PLUS 38 other "case histories" on a wide variety of materials and operations. Booklet contains 32 pages of factual information . . . perhaps the answer to your own machining problems. Mail coupon for your free copy.

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1367 N. Salina St., Syracuse 8, N. Y.

(In Canada, send to: Strongridge, Ltd., London, Ont.)

Please send your free "Case Histories" booklet on the ingenious uses of abrasive belt machining.

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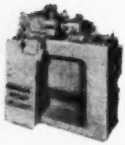
Manufacturers of SPEEDMATIC and GUILD Electric Tools

bryant
internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

no. 1109

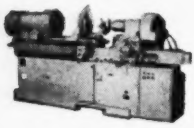
For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".

no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".

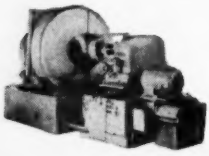


no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".

no. 1209

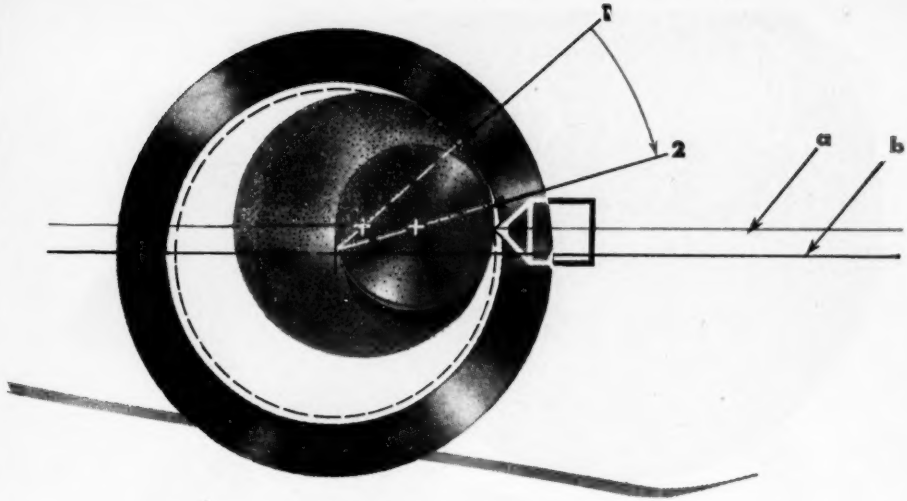
A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".

Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.



IF the internal grinder is to generate straight holes within precision tolerances, on a production basis, the various elements of the machine must be properly aligned. The axis of the work, the axis of the wheel, and the diamond must be in a plane parallel with both traverse and cross feed ways. Then the direction of feed will coincide with the line from the center of the workpiece to the point of contact between the wheel and the work, and the wheel will be dressed in line with its point of contact with the work regardless of the size of the wheel.

In the illustration above, these requirements are not met because the work center "b" is below plane "a" established by the wheel axis and the diamond. The drawing shows the wheel at its largest diameter (new) and also at its smallest diameter (worn). The difference between center heights "a" and "b" is constant during the life of the wheel. The position of the diamond remains constant for the life of the wheel. When the large wheel is dressed by the diamond it will contact the work at a point established by a line from the center of the work through the center of the wheel (position 1). When diamond sizing, the work, or wheel, is fed to a predetermined position. As the wheel wears down, it will continue to contact the diamond at the same point during dressing, but the small wheel will contact the work at position 2 and the size of the finished hole will be substantially smaller.

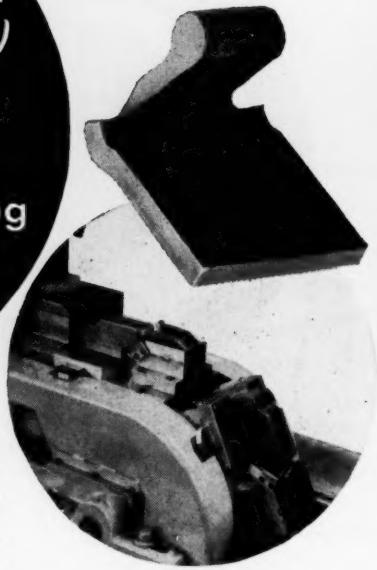
As the wheel wears, the point of contact between wheel and work will move gradually from position 1 down to position 2, and the size of the finished hole will become progressively smaller. This is one of the reasons that some internal grinders, when set up for diamond sizing, will not hold size during the life of the wheel. Many operators attempt to compensate for this error by constantly adjusting the diamond. The correct remedy would be to bring the axis of the work, the axis of the wheel and the diamond all into a common plane parallel with both traverse and cross feed ways. Finish size will then be correct regardless of wheel diameter.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

lower cost

per piece with continuous surface broaching of small parts



• In many plants where large quantities of duplicate metal parts are being machined substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

THE FOOTE-BURT CO. • Cleveland 8, Ohio

Detroit Office: General Motors Building

• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT

MACHINE TOOLS

MODEL J
10" x 18" Capacity

Check its

✓ CAPACITY
✓ STRENGTH
✓ 3-Point Suspension
✓ Safety
✓ Centralized CONTROL

and You'll buy a

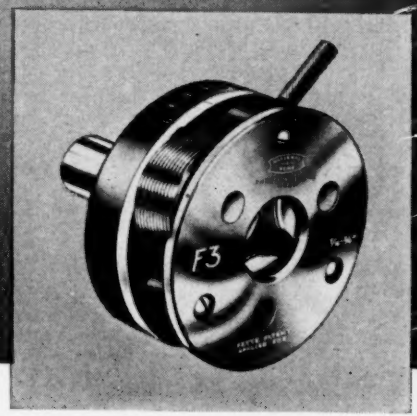
JOHNSON BAND SAW

WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.

ALBION, MICHIGAN

SAMPLE
Rolled thread on Clamp Screw
3/4"-10 pitch 6 1/4" long
Class 3-1045 steel
Time-9.5 seconds at 90 S.F.
Finish-20 Micro inch
Note: Rolling increased
Rockwell B hardness 5 points



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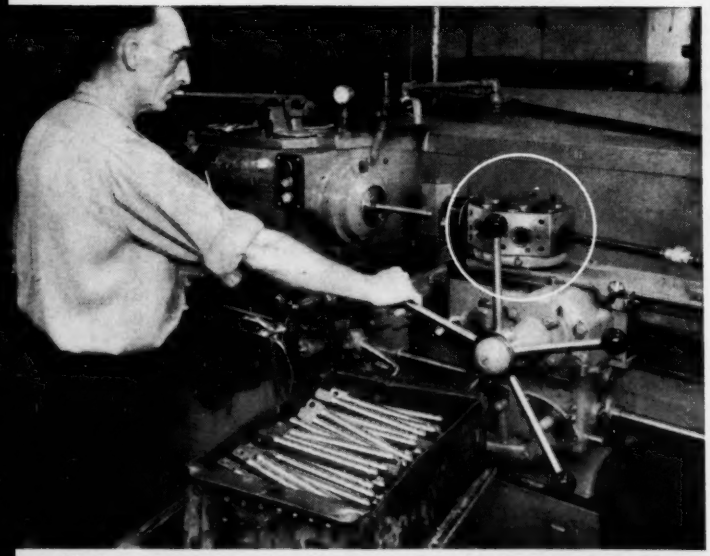

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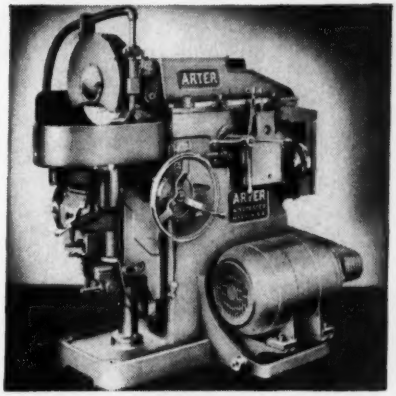

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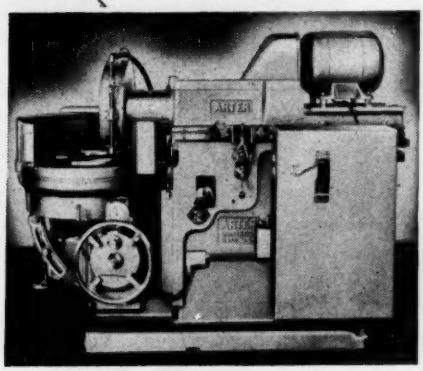

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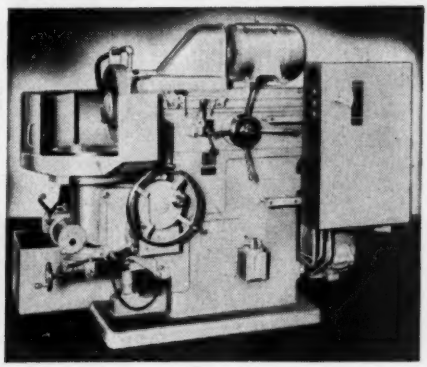

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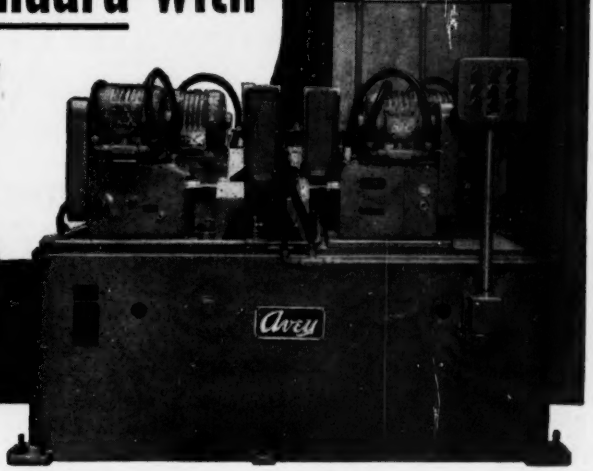

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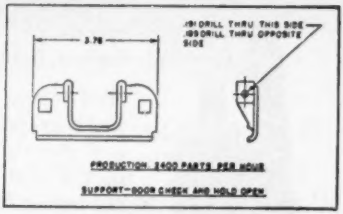
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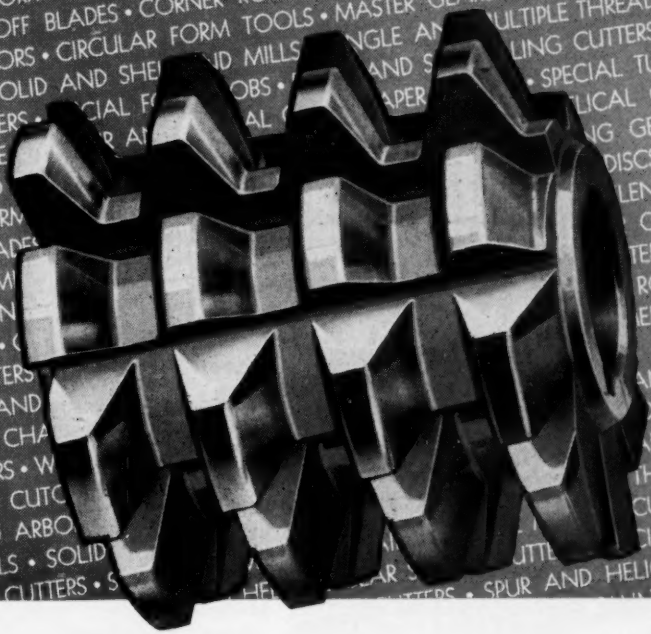

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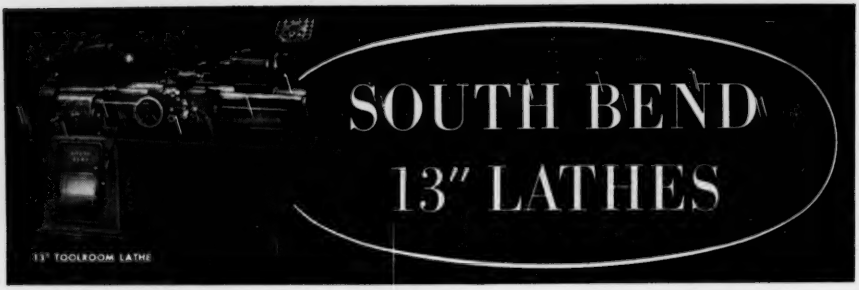

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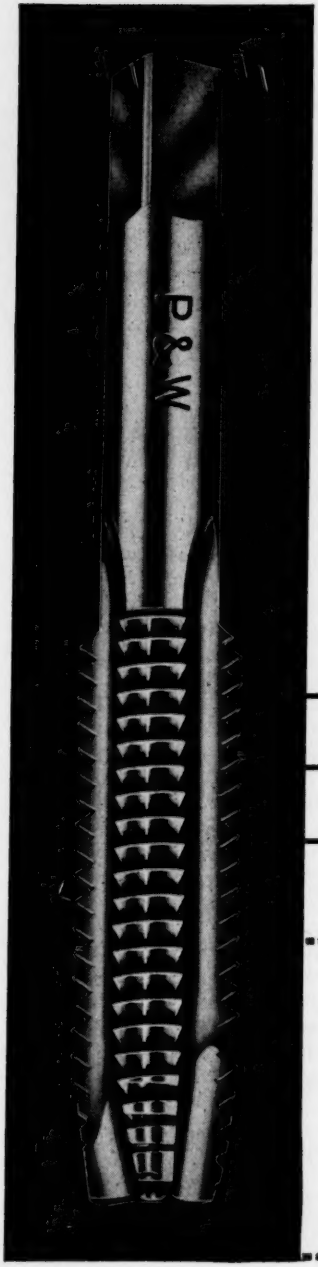

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over the editor's desk . . . .

Hiwage Holdup

A number of businessmen with whom we have recently discussed the problem of recurring demands for more wages express the opinion that they see no visible relief in sight. As long as business is good, and it looks to them that it will be good for some time to come, the pressure for more money, more benefits, more time off, and so on, will continue.

They feel that even if business slows down and rigorous measures to economize become necessary, any suggestion of a reduction of the present high wage level would be met with nothing but the strongest opposition. It is our belief, too, that of all the concessions made or granted during the past few years, the demands to continue payment of the highest possible wages would continue regardless of a company's ability to pay them.

Most of these businessmen are not bemoaning this fact which they feel they must face at some time in the future. On the contrary, they are actively engaged right now in investigating the possibility of cutting out material as well as manpower waste, looking for improved methods, reviewing new manufacturing techniques, and so on.

The payment of high wages can continue only as long as high production is maintained and high production depends to a great extent upon modernization. In order to help production executives who seek to keep abreast of the latest developments that provide more production, the September issue of MODERN MACHINE SHOP will contain specific examples of operations in many plants which point to the theme "More Production Through Modernization." We are sure that editorial material of this type will be of the greatest help in combatting the high wage challenge.

Your Responsibility?

Dr. George S. Benson, president of Harding College, writes us:

"During the last three months I have spent considerable time in Washington interviewing cabinet members and key people in Congress. It is my conviction that there is a strong determination among the present leadership of our national government, in both the executive and legislative branches, to drastically cut down on its size, its power, and its cost in tax dollars. But there is no certainty at all that it will be done.

"The special pleading groups do not constitute a powerful mass of deliverable votes, but they are vocal, and active, and they are insistently, constantly in contact with their congressmen and congressional committees, putting on the pressure. They have a way of presenting their appeal as if they were representing a whole state, or region, or even the majority of the people of the nation.

"'Will you be able to drastically cut the budget?' I asked a senator friend. He replied thoughtfully: 'Not unless public opinion can make itself heard in Washington above the demands of the groups who are coming here asking special consideration for all the things we're trying to economize on. There simply cannot be any genuine economies without a lot of groups and a lot of individuals having to make a small sacrifice in the national interest—in the interest of their own long-range personal welfare.'"

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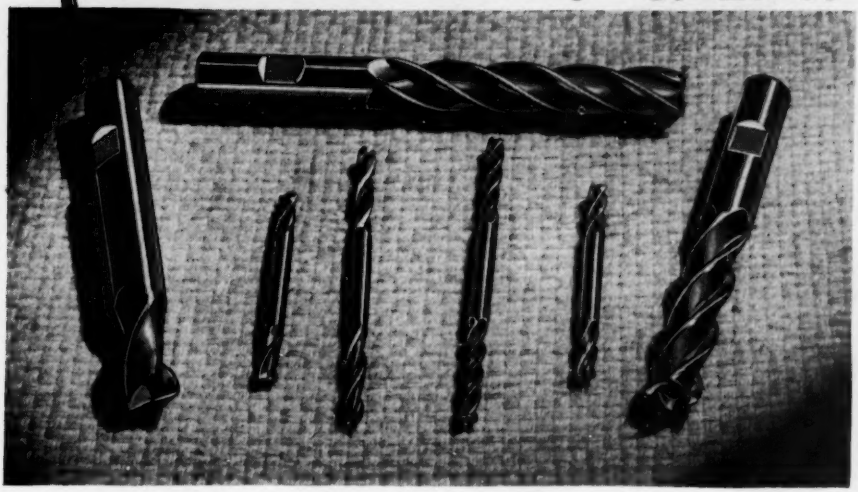

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MODERN Machine Shop

Vol. 26, No. 2
JULY, 1953

features in this issue

Rifle Clips by the Millions Produced in Progressive Dies *by James Belcourt*

This article describes the operation of the progressive dies that are used to produce millions of Garand rifle clips. Particular emphasis is placed on the devices used to minimize injury to the dies and also maintain continuous production. Page 120.

Welding Army Truck Mufflers *by James P. Moss*

A description of the operation of a fully automatic machine designed for making hidden arc welds on the ends of mufflers. Page 130.

Mass Production in Small Shops *by Byron Russell*

This article explains the procedure whereby a small shop may handle work on a mass production basis. Page 136.

Case History No. 6—Machining Stainless Steel *by G. J. Stevens*

The author describes a method of machining a cone-shaped part which is used in a poppet valve for the M-1 rifle. Page 143.

Universal Round Stock Drill Jig *by H. G. Frommer*

A description of a jig which provides for fast clamping of various sizes of round stock for subsequent drilling operations. Page 144.

Machine Shop Rating of a Foreman *by Robley D. Stevens*

The author points out the need for a closer relationship between top management and the foreman and several methods whereby such closer relationship may be obtained. Page 152.

Machining Fixture with Self-Centralizing Clamp *by W. M. Halliday*

A description of an interesting device for accurately holding hollow box-like iron castings while machining various surfaces. Page 164.

Precautions with Precision Measurement *by C. W. Kennedy*

A resume of helpful suggestions on the use and care of precision gaging instruments. Page 180.

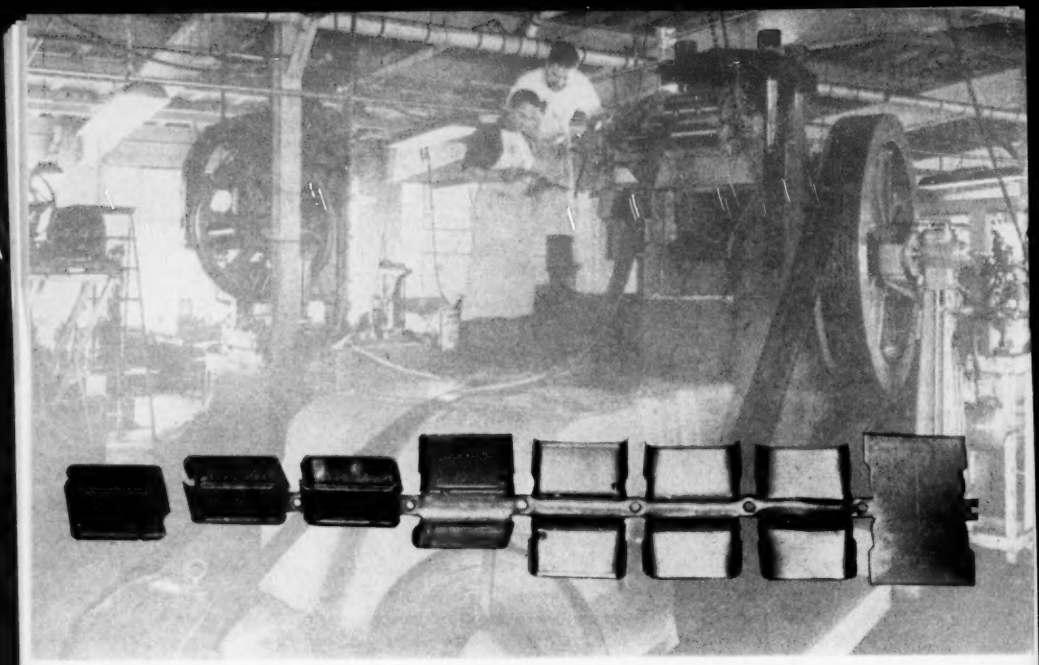


Fig. 1—(Inset) View of strip from the progressive dies that produce Garand rifle clips.

Rifle Clips by the Millions Produced in Progressive Dies

Precise automatic feeds are important factors in comparatively trouble-free setups. Well devised system protects expensive dies. Good gages aid in rapid checking and insure holding of close limits.

By JAMES BELCOURT

Foreman, The International Silver Company.

GARAND rifle clips of the M-1 eight-round type constitute an important defense product. Such clips are required in exceedingly large volume and are produced for Army Ordnance not only in government arsenals but by contractors, one of which is the International Silver Company's Meriden, Conn., plant. To date, this plant has produced some eighty million clips using three 100-ton SF5-34 Ferracute presses that average about 83 working strokes a minute and deliver one clip for each such stroke.

As shown in Fig. 1, these clips have a roughly U-shaped section. Each clip

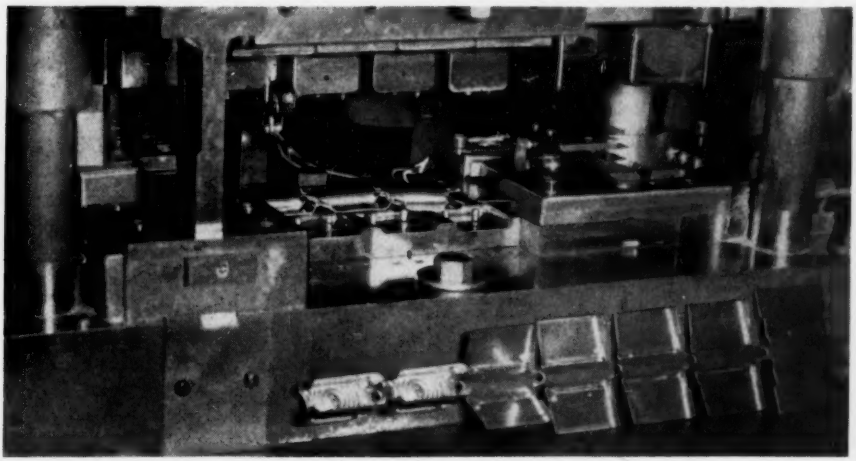
measures approximately 1⅛ in. high, 1⅛ in. wide and 2 in. long and is made from 1045 cold rolled steel strip 0.032 in. thick and 3¾ in. wide. Clips are produced in 10-station progressive dies, of the type shown in Figs. 2 and 3, built by B. Jahn Manufacturing Company, New Britain, Conn. Stock is advanced to and through each die by means of a Dickerman Die Feed of the type shown in Fig. 4. This feed is an important factor in the success of the setup.

Unlike many feeds, this type is actuated by a cam mounted directly on the punch holder of the die and so stock is moved in precise synchronization with the die and without the backlash of some feeds. Half of the feed occurs on the upstroke of the press and the remaining half on the down stroke but the stock is left free during the important part of the working stroke when indexing pins enter pilot holes in the strip and position the strip positively in successive die positions.

At the first station in the die, three pilot holes are pierced in a line transverse to the strip. Of these, the one in the center serves to index the strip at each subsequent station and is at the center of a connecting bridge left later between pieces. The other two are for piloting in the second station where no work save a slight straightening action is done. Blanking, done at the third station, shears out two T-shape pieces that sever the strip save for a narrow bridge at the center in which is the remaining pilot hole. Blanking shapes the two end contours of the piece, including the outer edges that are straight, but leave it flat and ready for the first forming. T-shape elements blanked out are pushed through the die and fall through the press bed into scrap boxes.

No work is done on the blank at the fourth station but pilot pins enter pilot

Fig. 2—Progressive die employed for making Garand rifle clips and, in front of the die, a strip taken from it, showing how the stamping is formed. Results of work at two initial stations and the final stations do not appear on the strip.



holes in the bridges at front and back to keep the strip centered from side to side. Initial forming occurs at the fifth station. This arches the center upward and finish forms four lips that are bent upward on radii at each end of each side or wing portion. Where the central arch ends at each side, a very small radius is formed.

At the next (sixth) station, a deep groove is formed at each side of the central arch and in each groove a latch notch or slot is formed. Each latch slot has almost square corners on the under side but they are not sharp enough to shear the metal. Final forming of the two wings occurs at the seventh station. There, a blister or detent recess is formed near one corner of each wing and a sharp bead is produced close to each latch groove. A shallower bead is also produced at the outer edge of each wing.

Although the forming done up to this point is important, most of it is not deep and the piece as a whole remains comparatively flat except for the rather deep arch through the center. At the eighth station, however, the arch is somewhat flattened and the two wings are bent upward about 45 deg. This leaves the piece ready for embossing stiffening concentric ridges that form a bullseye pattern on the bottom and for embossing an identifying stamp at the center. These operations are done at the ninth station and, at the same time, opposed cam portions of the dies force the two wings upward against the sides of the punch to complete the forming.

Fig. 3—View of the progressive die from back of the press. Wires lead to micro switches that are closed to stop the press if indexing is not correct or if the strip feeding should bow upward in such a way that die injury might occur.

As this forming is accompanied by some springback, the amount of which varies slightly with differences in hardness or temper of the stock, the punch is split to permit of slight adjustment in thickness or width. If the springback varies significantly, the punch is adjusted to bring the width between wings within specified limits.

Cutoff and clipping out along arcs occur at the final station. This severs the work from the bridge and the portion clipped out fall through the die. At the same time, the clip now completed as far as stamping is concerned,

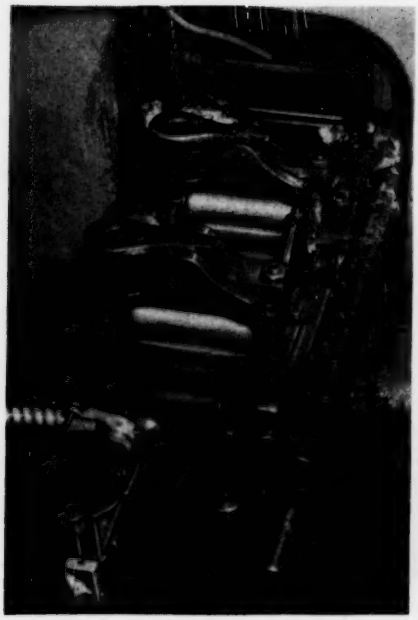


Fig. 4—Closeup of the Dickerman Die Feed on the die for clip production. Operation is by cams (shown in background) carried by the punch holder of the die thus insuring precise synchronization of the feed. Limit switch (foreground) trips to stop the press when stock runs out.

falls off the end of the die and down a chute to a belt conveyor.

As progressive dies for this work are expensive and costly to repair if injured, special protective devices, two of which appear in Fig. 3, are applied. Two others are seen in Figs. 4 and 5, the latter showing strip as it feeds in a loop from the independently driven Littell straightening rolls, that run continuously when the die is in operation. These rolls draw stock from a decoiler and the stock passes in a loop to the Dickerman Die Feed, Fig. 4.

Just before the stock enters this feed, however, it passes between a pair of felt pads pressed together by a thumbscrew clamp. These pads wipe both sides of the strip and sometimes are used to apply lubricant if that already on the strip is not sufficient. In all cases, however, a drip feed for lard oil is arranged to drop on the strip just before it enters the dies.

Although the Dickerman Die Feed is set to advance the stock 2.437 in. between working portions of the punch stroke, pilot pin indexing is relied upon for the precise final location at each

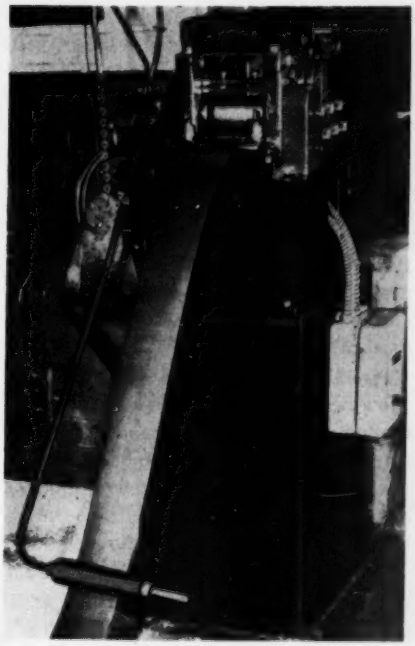


Fig. 5—Strip stock for clip production feeding from uncoiler (background) through the independently driven Littell straightening rolls toward the press. The limit switch above the loop is tripped as the loop rises, as it would if jerked.

Fig. 6 — Set of dial, snap and other gages employed to spot check 30 dimensions on clips taken each 3 to 4 min. from each press. If any dimensions are outside specified limits the corresponding press is stopped until the fault is overcome.

die station. To permit this, the Dickerman Die Feed releases the stock just before pilot pins enter corresponding holes, hence it is essential that no jerks of stock occur between the straightening rolls and the feed. So a sensitive micro limit switch is placed above the stock loop (as in Fig. 5) and, if a decrease in slack causes the stock to strike the roller on this switch, the press (equipped with an air operated clutch and brake) is stopped almost instantly.

Another micro switch roller rides on the stock just ahead of the Dickerman feeder and, if stock runs out, this switch is closed and also stops the press, as feed into the die would cease once the runout end passed the feeder and die damage might occur.

A third safety device includes a pair of micro switches appearing in Fig. 3. One is closed by the feed cam during a part of each stroke and is in series with a second switch actuated by a lever whose free end rides against the strip passing through the die. If this lever enters a recess of the strip as intended, the strip is properly located and nothing happens. If such entry does not occur, indicating that the strip is not in proper index, the two switches are both closed at once and the press is stopped.

Farther along in the die is a slender lever that normally is about an inch above the advancing strip and the strip will clear the lever unless something happens to cause the strip to arch upward, indicating some fault in operation. If such arching occurs, the lever is displaced, a connected micro switch closes and the press is stopped. These safety devices do not completely preclude the possibility of die damage but they do obviate many possible causes of jamming that might prove destructive if these safeguards were not applied.

Specifications for the clips require checking of 30 dimensions, some hav-

ing quite close limits and others permitting fairly wide tolerances. So checks are made each 3 to 4 minutes on clips from each of the three duplicate dies normally in use. Gages shown in Fig. 6, mostly dial or snap types, are used in succession along with visual checking of the samples taken during continuous runs. Dimensions checked include several likely to change significantly in later heat-treating, so most of these are held between much closer limits than are specified. When this is done, there can be some subsequent change and still keep within specified limits.

Stock employed for the clip must have 60 to 70 Rockwell hardness (before heat-treating) but as the stock is only 0.032 in. thick and is formed to U-shape section, some distortion in heat-treating is bound to occur. It can be minimized, however, by applying to the free ends of each slip a spacer which is itself a small stamping and appears in Fig. 7. This spacer is produced in progressive dies, one of which appears in Fig. 8. Stock used is cold rolled 1010 steel strip 2.187 in. wide and 0.032 in. thick.

Spacer stampings are made in three-station progressive dies in No. 2½ Niagara presses that run at 120 working strokes a min. and are equipped with Dickerman Die Feeds. These feeds advance the stock 1⅛ in. in a single motion while the dies are open and lock the stock while the impression is made, as pilot pins are not needed. A central rib is embossed at the first station, two oblong holes are pierced and the contour is blanked at the second station and, at the third, forming is done as the blank is cut off. An electronic "Protectron" is used on the motor driving the press and shuts the press down instantly and automatically in case an overload (such as might occur if the air ejector did not operate) is imposed on the motor.

Forming turns up lips at two ends and two sides of the spacer, produces a pair of narrow lugs next to the ends of the side lips and punch-forms lips at each oblong hole previously pierced.

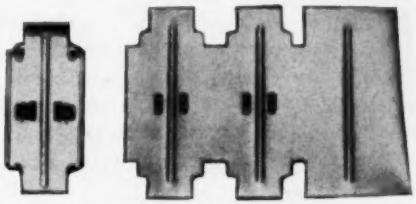


Fig. 7—View of workstrip and also finished spacer which is fastened to open end of clip during heat treatment.

Special air operated machines are used to assemble spaces over clips at a rate of 20,000 per 8 hour per machine. In this assembly, lips at the spacer contour fit over the free ends of the clip wings. Punches turn two lugs at holes outward so that they press against the inner walls of wings and clamp the spacer firmly in place. This holds the outer ends of the wings so that they cannot distort to the extent that they would do otherwise in the heat-treating that follows.

Before assembly, however, the clips are fed from a hopper into a Ransohoff machine, Fig. 9, where batches are tumbled for 12 min. in a mixture containing two pails of core sand and 5 gallons of water, to remove fine burrs. At the end of this period, a water spray is turned on to wash off the sand and the parts are fed out of the drum automatically and into another rotating drum containing a hot mildly alkaline solution to prevent rusting and aid

subsequent drying of the workpiece.

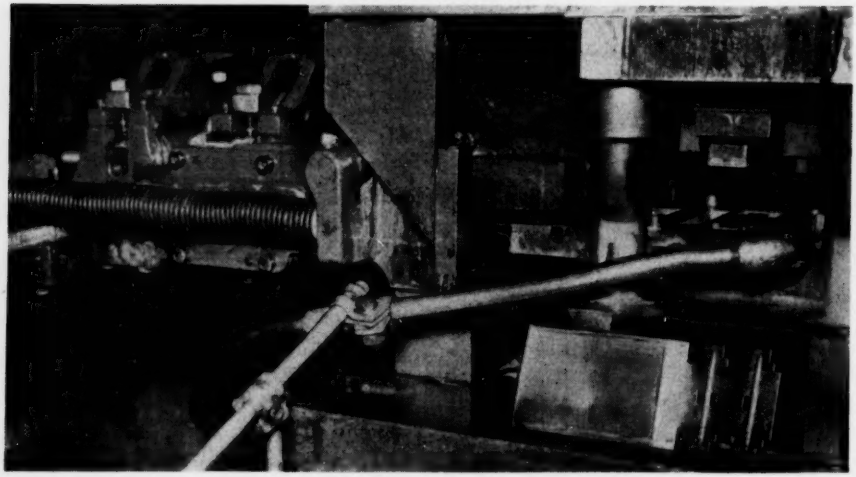
After assembly of clips to spacers, the assemblies are fed by belt into a continuous alkaline washer to remove any oil or grease and, after rinsing and drying, are discharged into a vibrating hopper that feeds a continuous electric hardening furnace served by a wire mesh belt. Ten to eleven thousand assemblies an hour are advanced through a fire curtain into this furnace. Assemblies attain a temperature of 1600 deg. F. in about 8 min. of travel and then are discharged automatically into an oil quench through a chute that is sealed because discharge is below oil level.

While in this furnace, the parts are in a controlled reducing atmosphere supplied by a G. E. atmosphere generator. Quench oil is held at 135-180 deg. F. by circulation through intercoolers. Quenching results in Rockwell D hardness of 67-70. Parts quenched fall into a conveyor that elevates them as they drain and then discharges them into a hot alkaline wash for removal of quench oil. After washing, assemblies are passed through two hot water rinses before they feed onto a wire mesh belt that carries them through a draw furnace.

In this tempering furnace, which is also electrically heated, parts attain a temperature of 560-580 deg. F. and remain 20 min. No atmospheric control is required but the air in the furnace is fan circulated to keep the temperature substantially uniform. This tempering results in 55-66 Rockwell D hardness. Discharge is at the rate of about 80,000 assemblies per 8-hr. shift and they are transferred by conveyor to a bench where they are hand fed into machines that remove the spacers from the clips. Spacers are scrapped because it would cost more to condition them for reuse than to make them from strip stock.

Clips then go to the Parkerizing set-

Fig. 8—Progressive die setup in a Niagara press producing spacers from strip stock advanced by the Dickerman Die Feed shown at left. Strip below the die shows the spacer before final forming and cutoff.



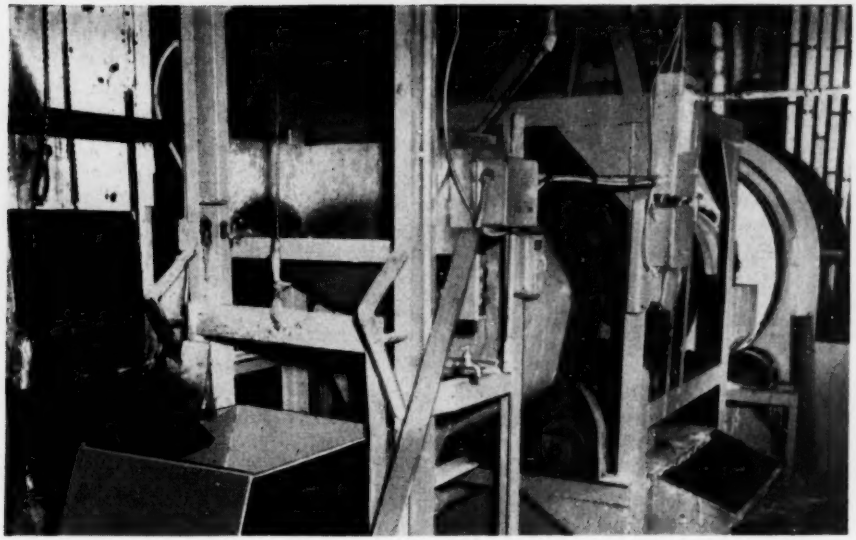


Fig. 9—Clips fed into the holder, left, are dumped into a hopper and feed thence into the Ransohoff machine shown where tumbling in a sand-water mixture removes fine burrs. After sand is washed off, clips are fed into an alkaline solution in the rotating drum shown in the background.

up shown in Fig. 10 and are loaded into perforated barrels. Handling of the barrels is done by a trolley hoist on an overhead rail. Treatment includes a short dip in oxalic acid solution, one cold rinse, a 30-min. immersion in hot Parkerizing solution, a cold water rinse and a 30-sec. immersion in dilute chromic acid solution. Barrels coming from the latter solution are dumped into a hopper equipped with a Syntron vibrator that feeds the clips to an oiling setup. After oiling, the clips are ready for final inspection.

Most of the final inspection is done by automatic machines one of which appears in Fig. 11. These machines were developed by Bay State Company and make automatic measurements on seven of the critical dimensions by applying carbide tipped gaging elements. Parts having any of these dimensions outside the specified limits are automatically rejected and fall into bins that segregate the clips according to the dimension that is outside limits.

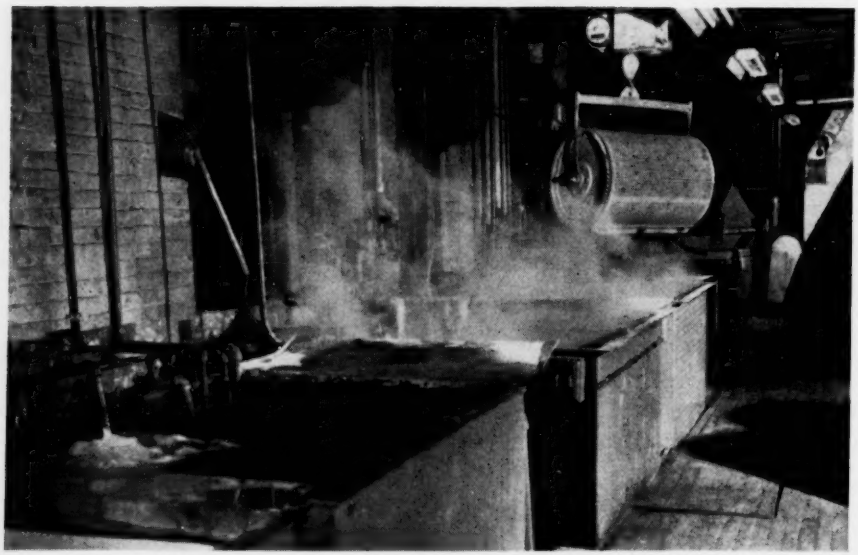
These machines are loaded by girl operators who, in so doing, pass each clip through a profile gage and discard any that are obviously distorted as a result of heat-treatment. Thence, the parts are indexed automatically along a track and come to rest successively at each of seven stations where the movable gaging elements, actuated by cams, are brought into gaging position. If at any station the dimension is outside specified limits, the part is automatically rejected as it moves toward the next station. Parts not rejected drop from the end of the machines into shipping containers at the rate of about 2800 an hour per machine used.

Dimensions automatically checked are designated as follows: endwise alignment, width of side max. and min, width of rear max, width above base, spread of top max. and min. These checks are applied to all clips but independent spot checks are made on parts selected at specified intervals from those coming from each automatic gaging machine. Gages used for spot checking are bench types identical with some of those shown in Fig. 6 but do not include all of those previously used. Those needed are applied as before and are employed to determine whether changes that may have occurred as a result of heat-treating have resulted in throwing dimensions outside the specified limits. If spot check reveal dimensions outside of limits, lots from which the clips come may either be checked completely or rejected without so doing.

In the foregoing mention has been made of certain conveyors but it remains to be noted that many not mentioned are employed. In fact, there is little manual handling and belt, cleat or other conveyors do all save a few handling jobs and, of these, some are of bulk lots. Manual handling of individual parts is done chiefly in assembly of spacers to clips, removal of clips and in doing gaging work.

There is almost no other manual handling from the time that coils are loaded to feed presses until the stamped products reach containers at the end of inspection machines. Naturally, this automatic handling contributes greatly to the overall efficiency of the setups and helps to minimize costs yet does not detract from quality which, in any case, has to be maintained at

Fig. 10—After heat-treating, clips are loaded into perforated barrels and are processed through tanks in this line to apply a rust resisting Parkerizing coating. Then oiling is done in equipment at the far end of the line.



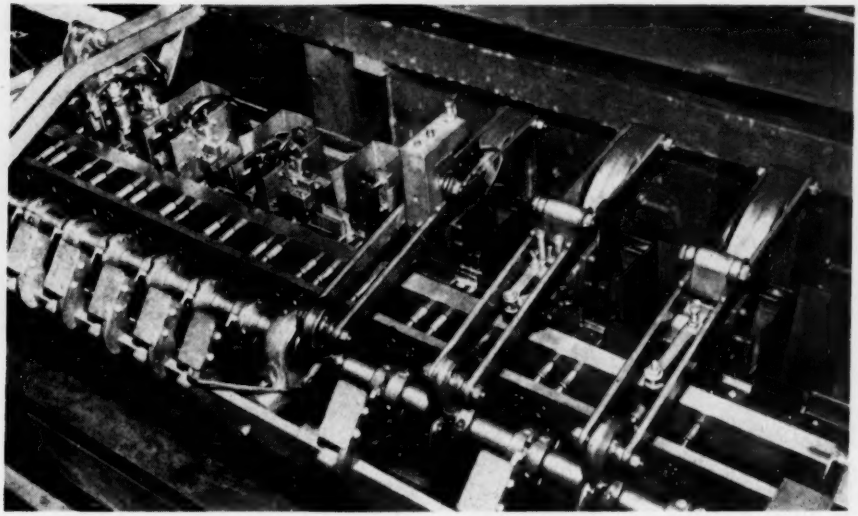


Fig. 11—Closeup of one of the final inspection machines that gages each of seven critical dimensions on each clip as it is indexed along a track. Off size parts are automatically rejected and segregated.

a high level so as to fully meet the exacting specifications which are imposed.

Introductory Engineering Materials. By Irving H. Cowdrey and E. L. Bartholomew, Jr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 424 pages. Illustrated. Cloth binding, board covers. Price, $6.00.

Emphasizing the logical development of basic concepts, this book offers an excellent elementary and descriptive treatment of engineering materials. A fundamental analysis of the several elements affecting the properties of materials used by various kinds of engineers, designers, and draftsmen is provided for the reader. The volume confines itself to a presentation of basic principles in order to give the student an uncluttered understanding and clear familiarity with the methods, materials, cause, and effect.

Since these basic principles remain unchanged beneath the flux of future development in the field or the introduction of new materials, this broad treatment offers a universally applicable method of thinking about materials, what they are, and the relationships between structures, treatments, and properties. Using a sound basis of cause- and-effect discussion in the explanation of the "why" of properties in relation to structures and processes, the book provides the student with a complete understanding of the physical picture. This is furthered by an emphasis throughout on correlation between structure and properties.

Welding Army Truck Mufflers

By JAMES P. MOSS*

Fully automatic machine makes hidden arc welds on elliptical ends after other arc, seam, and spot welds prepare subassemblies made from aluminum coated steel 0.060 inch thick.

MUFFLERS employed on army trucks are now being manufactured on a quantity basis by the Walker Michigan Division, Walker Manufacturing Company of Wisconsin at its plant located in Jackson, Michigan. Several types of welders, including automatic and hand arc as well as resistance welders, are employed to make all the joints that are required in assembly.

Basically, the muffler is a shell of elliptical section containing a perforated inner tube joined to an intermediate head and to short flanged inlet and outlet pipes that pass through the side wall of the shell. All components are formed from aluminum coated steel 0.060 inch thick. This is a heavier gauge than is ordinarily used in commercial mufflers but is thinner than in most products that include hand and flux covered arc welded joints.

Manufacture starts with rolling the

* Plant Manager, Walker Michigan Division, Walker Mfg. Co., Jackson, Mich.

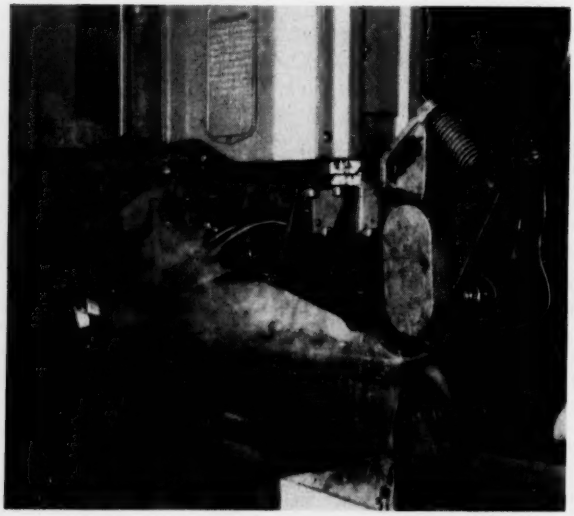


Fig. 1—Making the resistance type seam weld that produces a tight joint where the two edges of the shell, previously rolled to elliptical shape section, overlap.

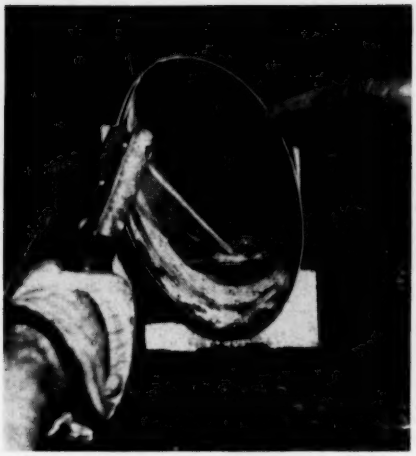


Fig. 2—Hand arc welding the inner end of one of the short flanged cross tubes to a supporting plate that has been spot welded previously to the interior of the shell.

elliptical shell and spot tack welding the seam to hold the edges in correct position for seam welding, which is done on a seam welder using the setup shown in Fig. 1. This is a conventional job and produces a gas-tight seam.

Next, a stamped inner plate is pierced for a pipe opening and is spot welded in place with the hole opposite one in the adjacent portion of the shell side wall, after which one of the short side tubes is inserted and is hand arc welded to the plate at the inner end, as shown in Fig. 2. A small outside supporting bracket is similarly welded to the shell.

After spot welding a stamped and flanged baffle plate to the shell and a flanged intermediate head to a perforated tube, one end of the latter is spot welded to a flange. Then, the shell assembly is placed in a vertical fixture, as shown in Fig. 3, the perforated tube assembly is added and is pressed into place by an air-operated slide that is part of the fixture. The second short flanged side tube is then added and is held in correct location by the fixture while the inner end of the side tube is arc welded at a hole in the perforated tube.

The 1-inch arc weld is little more than a tack weld designed to hold the slide tube in place until it is subsequently welded to the outer shell. When this tack weld is completed, the assembly is removed from the fixture and the intermediate head is spot

Fig. 3—After pressing the perforated tube subassembly into the shell in this air-operated fixture, the second cross tube is inserted and a hand arc weld about an inch long is made to fasten the cross tube to the perforated tube.

Fig. 4—Close up view of the machine whose automatic Lincoln head makes the elliptical hidden arc welds that join outwardly flanged ends to the muffler shell. One weldment is locked in the machine, and the operator holds one just completed.

welded to the shell. This completes the fastening of the interior parts to the shell, which is now ready to receive the two end head stampings.

These elliptical heads are stampings having short-drawn right-angle flanges around their contour and, when the ends are pressed into the shell in an air-operated fixture, the outwardly turned flanges hug the inside ends of the shell walls closely. Thus, at each end of the shell, its wall and the flanges form double walls and the mating ends of these walls have to be joined by continuous welds. One such weld is required around each end of the assembly.

To produce these arc welds at high speed on the relatively thin metal, a specially built completely automatic machine, as shown in Figs. 4 and 5, is employed. This machine is equipped with a standard Lincoln automatic head that includes feeds for the ⅛-inch L-60 wire and 780 granular flux. To make the head follow the elliptical path required in making these welds, a motor-driven pinion is carried on a vertical shaft having bearings supported in a head extension. The pinion meshes with an eliptical gear fastened to the underside of a beam directly above this head.

As the pinion is turned, it travels around the gear and in so doing causes the electrode to move through a corresponding elliptical path as required. To permit this motion, the head is supported, as shown in Fig. 5, by a pair of short links joined by a vertical hinge. One link is also pivoted to the frame of the machine. With this arrangement somewhat resembling a

pantograph support, the head moves freely in the desired path.

To support the muffler assembly, its lower end is placed on a fixture and the upper end is clamped by a pair of bronze plates that join on a line through the long diameter of the ellipse. Each plate is cut to a half-ellipse contour and, where these plates are brought together, the contours fit and grip the muffler shell close to its upper end.

The plate at the rear is fixed but the plate at the front is arranged to rock outward and clear the shell when the muffler is loaded and then to rock back and grip the shell before welding starts. These motions are effected by the ram of an air cylinder at the back of the machine. Both plates are beveled along their upper edges where they grip the shell, and the inclined surface of the bevel forms the floor of a groove that holds the granular flux next to the weld as the flux is fed to cover the arc.

To make a weld, the operator first sets the muffler in place by hand and then presses a button to start the cycle of the machine. This causes the clamping plate to first move in and grip the muffler and the head to move into welding position, whereupon the flux feed starts and the electrode wire feeds down to strike the arc. At this instant, the head starts to move along the elliptical path, making the hidden arc weld as required. When the full ellipse has been traversed, the current supplied by a d.c. generator back of the machine is shut off automatically,

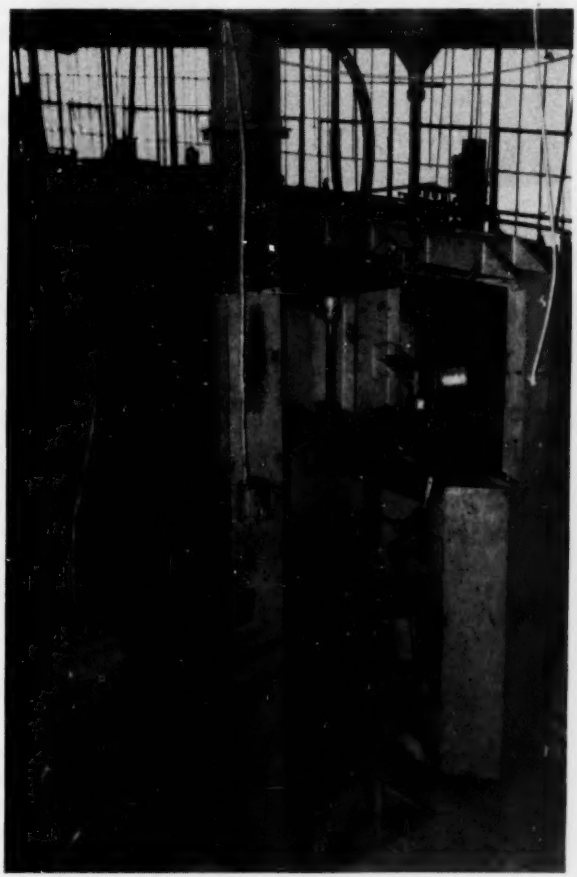


Fig. 5—Rear view of the specialy-bulit welding machine, showing the welding head supported on hinged links, the air cylinder that clamps the workpiece, the flux elevator and upper hopper, and the d.c. welding generator that supplies welding current.

Fig. 6—Using inert-gas welding equipment to make the weld that fastens one of the short flanged cross tubes to the shell of the muffler. This is the final production welding operation on the assembly.

breaking the arc and causing the head to swing clear of the work. Thereupon the clamp plate is opened and the muffler is ready to be shifted by hand, end for end, to repeat the cycle and make the weld at the second end of the muffler.

When the clamping plate opens, most of the excess unfused flux drops into a hopper below the positioning fixture, and flux remaining on top of the muffler is dumped into the same hopper as the operator removes the weldment from the machine. Some fused flux clings to the weld but most of it drops off as it cools, and any remaining flux falls off when the weldment is tapped with a hammer. Flux collected in the hopper falls onto an air-vibrated screen, and unfused particles pass onto an elevator that returns them to a hopper above the machine for reuse. Fused flux does not pass the screen but slides off it into a waste receptacle.

In this special machine, welds are made at both ends of about 35 mufflers per hour. One operator attends the machine but need only load and unload the work and press the start button as all other operations are automatic. Before the machine was installed, the corresponding welds were made by hand inert-gas arc welding, but this machine does the work fully twice as fast.

Completion of the hidden arc welds in the machine does not quite finish the welding of the muffler, as it is still necessary to make the weld joining one side tube to the shell. This work is done by inert-gas arc welding, as shown in Fig. 6, since the joint has a somewhat irregular contour and no automatic machine for making the weld is available. A filler rod is used in this welding operation, which can be performed even if the gap around the tube varies somewhat, as it does in practice.

When all welds on the muffler are completed, the muffler is placed in a fixture and air at 4½ p.s.i. is applied to the interior after openings are plugged. Then, the muffler is submerged and if air leaks are found, hand welding with acetylene gas is used to stop the leaks. Subsequently, any sur-

faces not covered by the aluminum coating are brushed with aluminum paint before the assembly is shipped.

(Illustrations courtesy The Lincoln Electric Company)

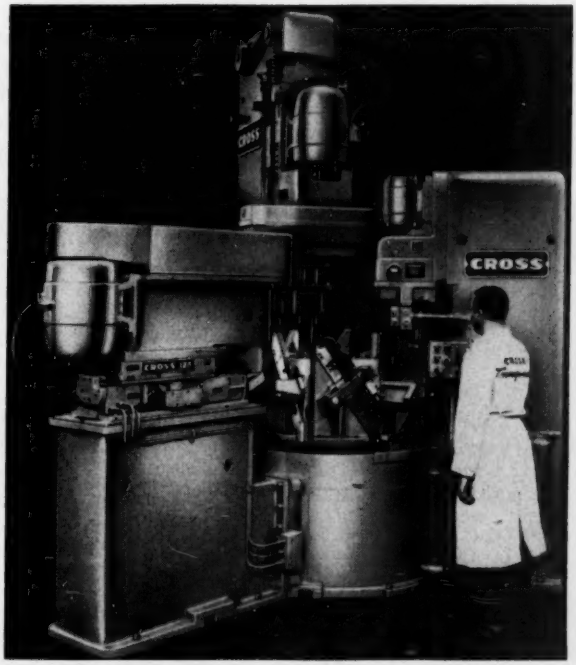
Jet Aircraft Blade Production Film

A 16-mm. 17-minute movie showing the production of jet aircraft blades has been released by Utica Drop Forge & Tool Corp., Utica 4, N. Y. The movie pictures the entire manufacturing process from sinking of the forged dies through the various steps of precision forging, machining, and final inspection. A wide variety of blades were used to include as many types of modern high-precision manufacturing operations as possible. The film was produced in cooperation between Carborundum Company and Utica Drop Forge and was taken in Utica's Yorkville, Whitestown, and Clayville plants. Supplementary footage of jet planes in action was supplied by Bell Aircraft Company.

The movie was made especially for use by industrial arts classes in technical high schools and colleges; however, the film is expected to be of wide interest as it is presented in a nontechnical fashion.

Special Machine Tool for Exhaust Manifold Tailpipe Pads

BUILT by The Cross Co., Detroit 7, Mich., this special machine is designed for milling, boring, drilling, chamfering, and tapping the exhaust manifold tailpipe pad for six-cylinder engines. The five operations are performed at the rate of 120 pieces per hour at 100 per cent efficiency. The parts are held on a fluid, motor-driven index table with six stations—one for loading and unloading and one each for milling, boring, drilling, chamfering, and tapping. Hydraulic and electrical construction is to J.I.C. standards. Other features include hardened and ground ways, hydraulic feed and rapid traverse, individual lead screw feed for tapping, and automatic lubrication of working parts of the machine.



Mass Production in Small Shops . . . . .

By Byron Russell*

This article points out what can be accomplished in the way of mass production in a small shop if proper consideration is given to all production angles.

IN these days of defense production, of contracts, subcontracts, and sub-subcontracts, many small shop operators avoid the larger, more lucrative jobs mainly because they think they are not properly tooled for the work and cannot finance the necessary tooling. What they forget is that their next-door neighbor may have the exact tool required, and may also be looking for work. Thus, by pooling their equipment, either one of them could enter a contract that otherwise would go to some large, well-equipped manufacturing organization.

Another factor often overlooked is that in producing a large number of similar parts, very specilaized and therefore very simplified tooling can be employed. A tool needs to function for a single purpose only, and does not require versatility which in turn introduces complexity. Quite often such tools, especially the specialized jigs and specialized check fixtures, can be produced right in the shop at a minimum of cost.

* Owner-Manager, Airline Welding and Engineering Co., Hawthorne, Calif.

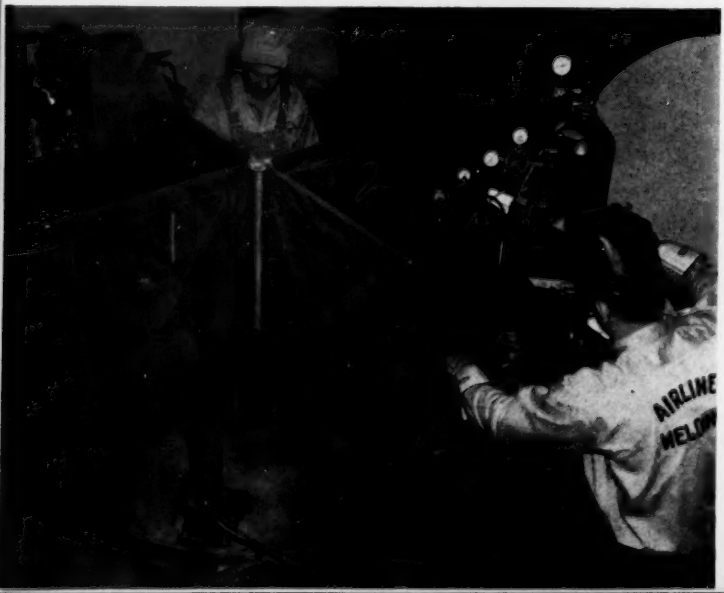


Fig. 1 — Overhead view of the rotary welding table, showing the four jigging positions for the ejector unit components. The man on the opposite side of the table jigs the parts. The jigged unit then indexes at the automatic preheating torch shown in the lower left foreground. The part next indexes before the welding operator who starts the automatic unit for welding the base plate and then manually welds the top plate in place. The operator in the far background is welding on the unit ears.

Fig. 2—Details of the mandrel jig, four of which are constructed on the rotary table. Neither the base plate nor the tube body can be jigged in any way except rightly. The base plate is positioned first and the tube body next. The hold-down ring shown just behind the mandrel is then clamped down on the base plate.

The above implies our situation at Airline Welding and Engineering Company in Hawthorne, California, when Fletcher Aviation Corporation of Pasadena, California, called for bids on the production of a great many thousands of ejector units for airplane drop tanks. This company demands the utmost in precision, workmanship, and consistency, and will accept no less. These parts would have to be delivered at a rate of many hundreds each week and must maintain a consistency of quality and dimensional accuracy so that Fletcher Aviation would only have to spot-check during inspection.

A check on the part's construction indicated that a punch press would be needed in its production. We didn't have this tool, but another small shop down the street, Giltsch Manufacturing Company, had such a tool and time to use it. We could produce the necessary dies in our own shop. Further study of the part indicated that the components could be jigged on simplified but precision mandrels equally spaced on an indexing turntable so that the part components could be mounted by one man, indexed next at an automatic preheating torch, and then turn into position for automatic welding of the flange end while the cap end was being manually welded in place. It was estimated that with this setup, we could produce a part every few minutes. This would put us far enough ahead of the many hundreds of parts per week schedule so that employees could be alternated on jobs, thus simplifying the help problem.

Further study of the part revealed that a very simplified check fixture could be constructed that would indicate in a matter of seconds whether or not the finished part met dimensional requirements. Spot-checking the welds with a dye penetrant would give us control over quality.

We knew minor technical difficulties would crop up in getting the part in production, but with major details and the necessary simplified but precision tooling planned in advance — tooling we could produce in our own shop— we bid and got the job.

The tank ejector unit consists of a length of 3-inch chrome-moly tubing, of 0.090-inch wall thickness, punched with four equally spaced holes and a slot and welded to a drilled base plate. The unit is topped with a welded-in punched cap and equipped with two welded-on attachment ears. The length

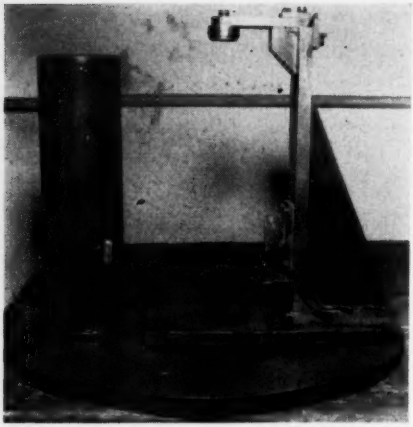


Fig. 3—Check fixture used for checking dimensional accuracy of the finished part. The ejector unit indexes on the pins in the base plate of the check fixture and then the overhead hinged plug swings downward and indexes with a minimum of tolerance in the hole in the top of the part. This brings the holes in the ears of the part into alignment with the hole in the flange on the fixture upright. The holes must coincide within the tolerance of a tight pin fit.

tolerance of the finished unit is plus-or-minus 0.030 inch; ear placement (the space between the ears) must be held to plus-or-minus 0.010 inch. With the base plate and cap hole indexed, the hole drilled through the ears must index close enough for a tight pin mounting.

We constructed the turntable as shown in Fig. 1, before producing a single part. This table is equipped with four precision vertical mandrels centered between four pins which accurately space the base plate. The mandrel is equipped with a spring-actuated holder which retracts as the tube body is slipped downward over the mandrel and then springs outward again into the tube body slot. Thus, it is virtually impossible to jig the tube body in the wrong position. The base pins and the holes in the base plate are of slightly different size at the opposite ends; therefore, the base plate can fit in one position only. These features make correct jigging of the components automatically necessary.

After the parts are jigged, a holding ring is slipped down over the tube body

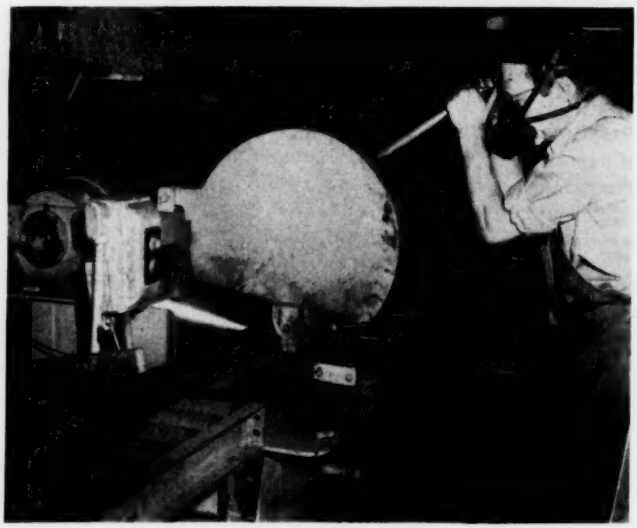
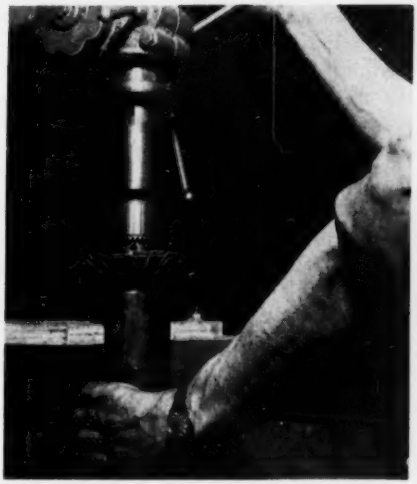


Fig. 4 — Cutting the chrome-moly tubing into part component lengths with an abrasive cut-off saw. Saw is equipped with automatic stop to speed work, and tube body lengths are cut 1/32 inch too long to provide melt-down metal for welding.

Fig. 5—Deburring the ejector tube body sections. Ordinary heavy abrasive cloth, slit along the radius at frequent intervals to provide flexibility and mounted in a conventional drill press, is used.



and clamped against the base plate. This ring provides the necessary clearance for the automatic welding of the base plate to the tube body. Figure 2 illustrates this simplified but precision jigging operation.

We also constructed the check fixture shown in Fig. 3 immediately. In using this fixture, the holes in the base of the tank ejector unit index on the base plate pins of the check fixture, while the hinged plug at the top of the fixture indexes in the hole in the top of the unit. This brings the holes drilled through the ears in alignment with the check hole drilled in the flange on the check fixture upright. These holes must align within the dimensions of a tight pin fit. While extremely simple, this check fixture has proved so reliable that Fletcher Aviation Corporation runs only occasional spot-checks on the dimensional accuracy of the ejector units.

The minor technical difficulties we had anticipated showed up first in the punch dies constructed to punch the holes in the base plate. We made the dies

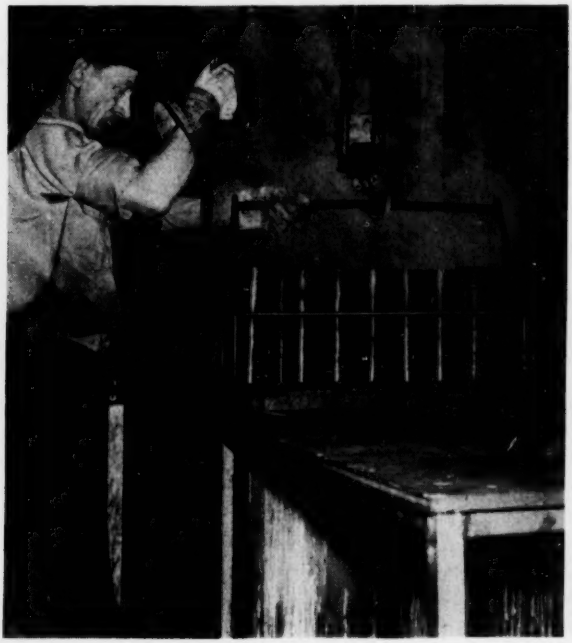


Fig. 6 — Degreasing and cleaning tube body sections in a hot tank. Two baskets are used alternately; one is immersed while the other is being unloaded and loaded.

accurately to size, and, as a result of expansion of the base plate during welding, it was difficult to remove the hot unit from the mounting pins. We had to rework the dies sufficiently off-size to compensate for this expansion. A second difficulty was encountered by Giltsch Manufacturing Company in obtaining an abrasive cut-off saw that

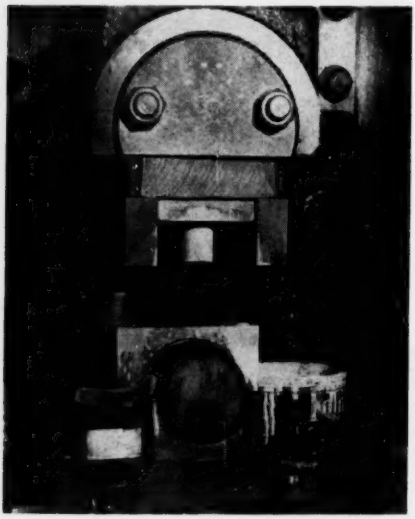


Fig. 7—Punch dies used to punch four equally spaced holes near bottom of tube body section. The dies punch one hole at a time and then are manually indexed to the next position.

would cut the tough chrome-moly steel tube without undue wear. This problem was finally solved.

The tube bodies are cut $\frac{1}{32}$ inch too long to provide excess metal for melt-down during welding-in of the cap. A tungsten arc is used for this purpose and, by providing metal for melt-down, no filler rod is required, thus eliminating the problem of slag, fluxing and splatter. The bottom plate is automatically welded in place, using a submerged arc to prevent splatter, with Oxweld No. 32 CMS filler rod of $\frac{1}{16}$-inch diameter. Constant potential welding equipment, assembled in our own shop, provides the welding current and accurately controls rod feed.

With tooling ready and technical difficulties ironed out after some trial runs, we were soon in production on the huge order. We fell behind the required parts-per-week schedule for the first three weeks; however, in six weeks we had regained lost ground and were gaining on the schedule. Only seven men were being used in production, including the Giltsch Manufacturing Company employees, and in many intervals these men had time for other work.

A description of our production processes and how we managed to curtail the cost of tooling not ordinarily found in small shops should aid others who want to tackle big jobs and turn out parts on a mass production basis. The chrome-moly tubing is delivered to Giltsch Manufacturing Company in long lengths and placed in racks convenient to a roller table leading to the abrasive cut-off saw, as shown in Fig. 4. The saw is equipped with an automatic stop for correct placement of the material for each tube body cut. One man, in an hour, can cut enough tube body lengths for a considerable production run.

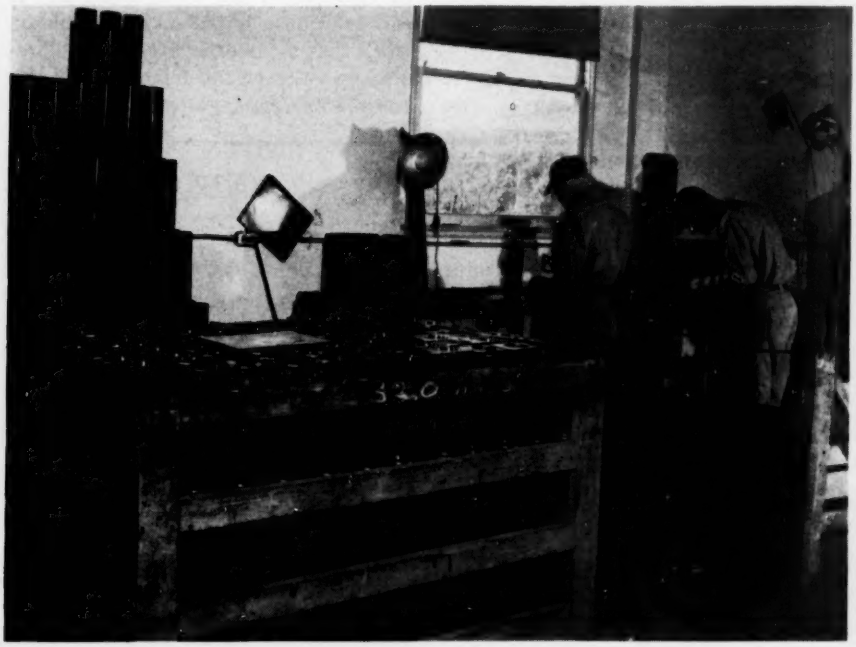
The next step is to deburr the featheredge characteristics of abrasive cut-off work. This is accomplished by cutting discs of heavy abrasive cloth, slotting along the radius at intervals so that they will bend inward, and then mounting them on a conventional drill press, as shown in Fig. 5. With this setup, the tubes can be deburred quickly and efficiently.

The tube bodies are then degreased and cleaned in a small hot tank using two baskets which are loaded and immersed alternately, as shown in Fig. 6. Here again one man can clean a lot of tube bodies in an hour's time. The tubes are then punched using the indexing die set shown in Fig. 7. The bottom plates and ears, which require only conventional flat punch dies, are dry tumbled after punching to remove any featheredge and to clean the surfaces. The part components then leave the Giltsch Manufacturing Company and are ready for our own shop.

Our rotary welding table, shown in Fig. 1, requires only two operators—one to remove the finished part and rejig another, and a second operator to tungsten arc weld the ejector top in place and operate the automatic submerged arc which welds the tube body to the base plate. Under-table V-belt drives rotate the jigged tubes both for preheating and for automatic welding.

When the units leave the rotary table, they are set up again in another simplified jig and the ears are aligned and welded on. The units then go to the inspection table shown in Fig. 8. Here the first act is to remove by grinding any internal roughness caused by excessive penetration during welding and to smooth the bottom plate by brief contact with a 6-inch belt sander. The units are then placed on a surface plate, and a feeler gage is used to check for bottom flange dis-

Fig. 8—Mass production emphasized! Beyond the mass of parts, inspectors are checking finished ejector units.



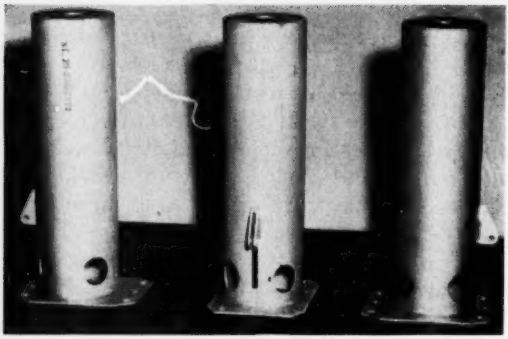


Fig. 9—Finished, sandblasted, and cadmium plated, these ejector units are ready for delivery to Fletcher Aviation Corporation.

tortion. The next step consists of placing the units into the check fixture for a check on dimensional accuracy.

While the some twenty inches of weld bead on each tube are all given close visual inspection for weld consistency and quality, dye penetrant spot checks are used to supplement visual inspection. This gives us close control over invisible faults that might start to occur.

After inspection, we are in effect finished with the work ourselves. The units are then sent out for sandblasting and cadmium plating, after which they are returned to us for delivery to Fletcher Aviation Corporation. Figure 9 shows some of the finished, sandblasted, and cadmium plated ejector units ready for delivery.

This article is not written to cherish what we have accomplished in the way of mass production in a small shop, but has as its sole purpose to point out what can be accomplished in the way of mass production in a small shop if proper consideration is given to all production angles. Proper tooling, of course, forms the heart of each situation. But as already pointed out, this tooling can be so specialized that the complexities generated by versatility are entirely eliminated, and tooling costs can be held down to a point where the tool can be economically scrapped after the job is done.

Preplanning, of course, is necessary. No small shop, minus a wide variety of convertible tools, would want to bid on a huge production order blindly. The shop might suddenly find itself in need of tools beyond its ability to finance. However, by a bit of thought beforehand, by predicting all requirements, and by seeking a solution within his means, the small shop owner can take on a lot of mass production work that is now feeding into the production lines of the huge, well-equipped manufacturing organizations.

"Could I see the job order on this, Romeo?"

Case History No. 6 Machining Stainless Steel

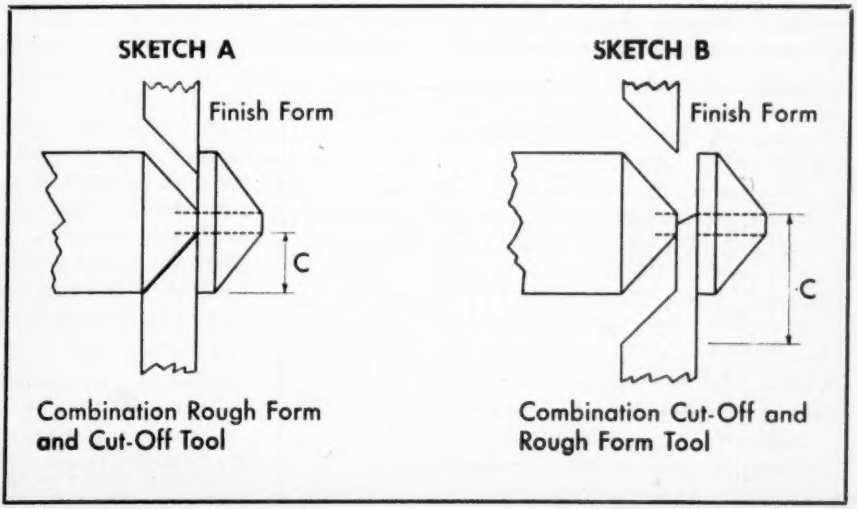
By G. J. STEVENS*

Problem: A shop was having trouble in machining a cone-shaped part used in a poppet valve for the M-1 rifle. The material was Type 416 stainless ½-inch diameter bar stock. The problem was to attain a satisfactory finish on the conical section and yet maintain a reasonable cut-off finish (see sketches). After watching the operation in a B & S automatic, the machining engineer saw that the difficulty lay in the use of a combination roughing and cut-off tool.

While this type of tooling can be used on non-ferrous materials, such as brass, it will not work well on stainless steel. The width of the tool builds up too much heat and pressure on the side of the piece before parting. Its advantage of a short stroke must be disregarded (see Sketch A; note "C").

Solution: The setup was changed to the conventional type of tooling (see Sketch B) which worked satisfactorily. However, the time cycle per part was increased slightly because of the longer stroke. The engineer suggested that this could be compensated for by a change in tooling composition. A cast alloy type likely would permit a slightly increased f.p.m. rate—enough to make up the lost time.

*Machining Engineer, Armco Steel Corp.



Combination Rough Form and Cut-Off Tool

Combination Cut-Off and Rough Form Tool

Universal Round Stock Drill Jig

By H. G. FROMMER

The author decsribes the features of a jig which provides for fast clamping of various sizes of round stock for subsequent drilling.

IN the July 1951 issue of MODERN MACHINE SHOP the author described a universal round stock drill jig designed especially for cross drilling round stock on a small and medium production basis. The present article discusses the counterpart of that jig—a high production, fast clamping, universal drill jig which is designed for round stock of various sizes with a diameter range differential of approximately 1 inch. Thus far, we have built, tested, and used in our plant the following three sizes of jigs: ¾ to 1¾-inch diameter, 1¾ to 2¾-inch diameter, and 2¾ to 3¾-inch diameter. The universal feature of each jig is limited, however, inasmuch as each different workpiece usually requires its own drill plate. Nevertheless, these plates are quite simple and one can be made in but a few hours of toolroom time.

Figure 1 shows a schematic end view of the jig. The work (1) rests in machined vees (if desired, hardened, replaceable wear strips can be used for lining) of the jig main body (12). An upright ledge (2), that is welded to the main body, extends along the entire length of the jig, the ledge being accurately machined on the top and on one edge. The removable bushing plate (5) with the drill bushings (6) is machined to match the machined surfaces of ledge (2). Three accurately bored holes in the ledge (2) serve to hold

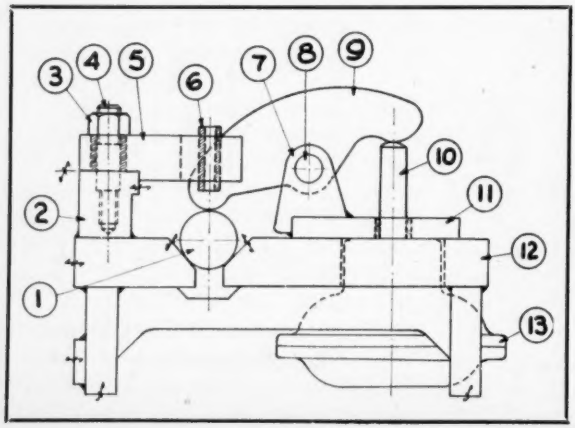


Fig. 1—Schematic end view of universal round stock drill jig

Fig. 2 — Illustration showing universal round stock drill jig set up for use, including spring employed to return clamp to original position after workpiece is unclamped

three stationary combination dowel-lockscrews (4). Two of these dowel-lockscrews are on the ends of the jig and one is located in the center. Bushing plate (5) requires only one accurately bored and bushed hole to match one of the dowel-lockscrews since the milled edges locate the bushing plate positively in all other directions. The reason for providing three dowel-lockscrews is to give flexibility to the position of the bushing plates as some workpieces may require but a very short bushing plate on either end or in the middle of the jig.

A hex nut (3) clamps the bushing plate in place. Chip clearances are designed into the bushing plates to permit variations between small and large diameter workpieces.

The clamping device consists of a bell type clamp (9) which pivots within a yoke (7) with a pin (8). The yoke is welded to a plate (11) which, in turn, is bolted to the jig body. Clamping power is obtained through an air brake (13) which is bolted to plate (11). The air brake plunger (10) forces the clamp against the work. The clamp is returned to its original position by means of a spring, as shown in Fig. 2.

Air brakes are ideally suited for such an application; they are physically small as compared with clamping force, they are inexpensive, and they require no oiler or filter for the air supply. The model shown in Fig. 2 exerts a force of about 800 lb. and lists at approximately $22.00. Other sizes in this line of air brakes provide forces up to 3,500 lb. and range up to $40.00 in cost. (Force figures given here are based on 100 pounds per square inch air-line pressure.)

To locate the workpiece endwise, we designed, as shown in Fig. 3, a three-way stop—one position for parts of a length approximately equal to that of the fixture, the second position for parts that are shorter than the fixture, and the third position for parts which are longer than the fixture. The stop is actually a swing gate with a reamed hole.

For parts of a length approximately equal to that of the fixture, the gate is fastened in the upper position and locked and the work is stopped against the gate proper. For such parts, the bushing plate is designed in such a way that no setup is required; i.e., the distance from the stop to the

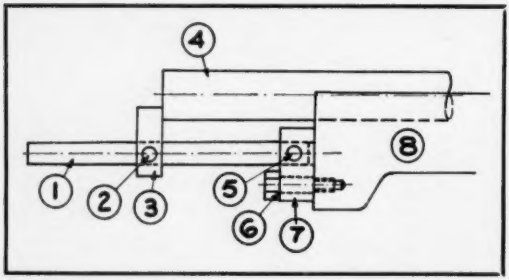


Fig. 3 — Sketch of three-way stop used to locate workpiece endwise in fixture

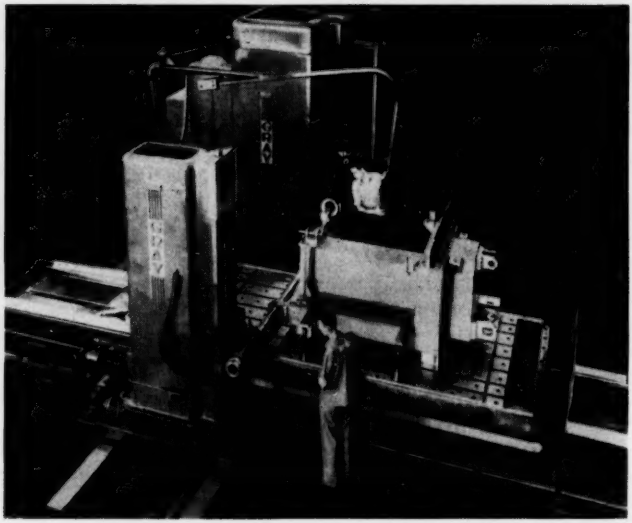
bushing hole in the bushing plate is the same as the part print calls for. For shorter workpieces, a rod is inserted through the stop gate and tightened by means of a set screw. A set-up operation is required to adjust this rod. For workpieces that are longer than the fixture, the stop gate (7) is swung down so that the workpiece (4) can extend beyond the fixture (8).

The rod (1), locked by set screw (5), is also extended, as shown in Fig. 3. A sliding block (3), fastened by a set screw (2), acts now as locating surface for the work. Here, too, set up of the stop rod is required. Hinge bolt (6) is the hinging and locking device for the stop gate.

The finished surfaces shown on the left side of the fixture in Fig. 1 serve as a guide for sliding the fixture along a "fence" in order to simplify positioning if more than one hole is drilled in each workpiece during one operation.

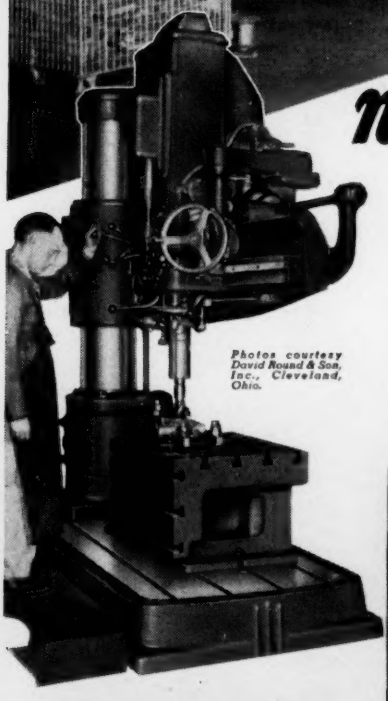
Huge Planer Type Horizontal Boring Machine

A RECENT installation at the Boeing Airplane Co., Wichita, Kansas, Division, is this huge 6-inch planer type horizontal boring machine, product of The G. A. Gray Co., Dept. 8, Cincinnati 7, Ohio. The unusual precision of this machine is evidenced by the fact that the Boeing uses it as a toolroom unit to make master gages for B-47 Stratojet Bombers. The master gages, in turn, are used as the basis for the production gages that are used in daily assembly and machining operations. The work illustrated on the machine is a master control gage used to make aft wheel master gages. The table will accommodate a workpiece 12 feet long, 6 feet wide, and 6 feet high.



before, ~~20~~ minutes...

now, 6 minutes



Photos courtesy David Round & Son, Inc., Cleveland, Ohio.

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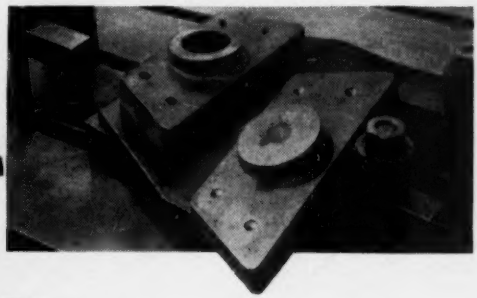

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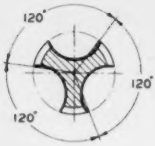

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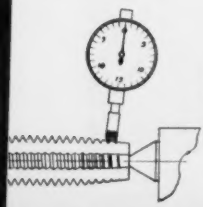
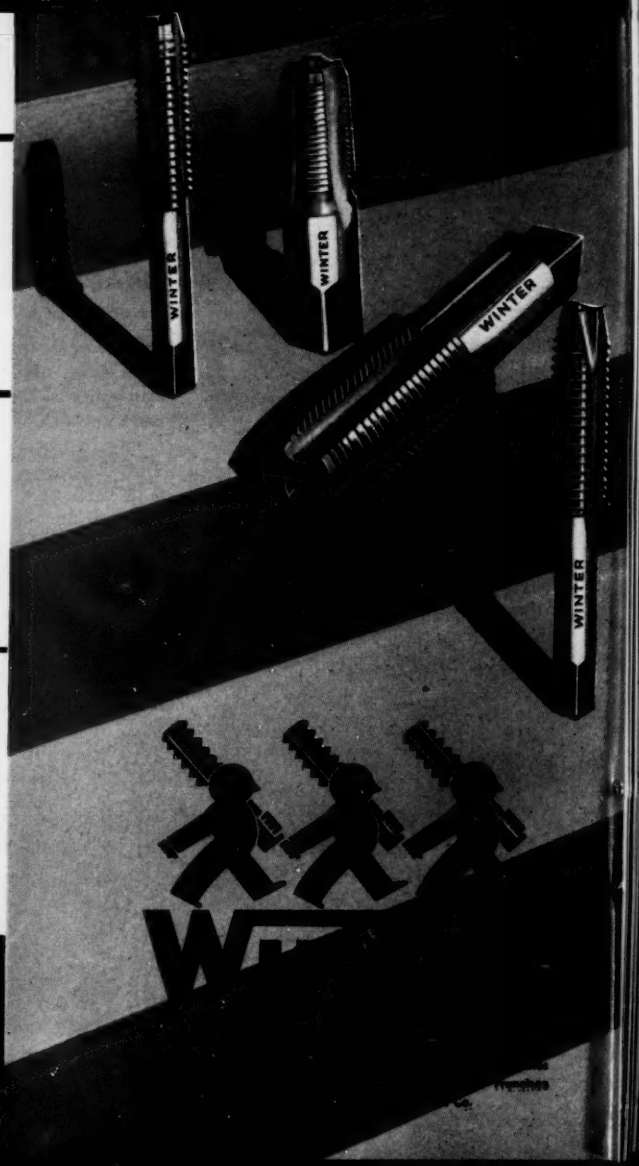


By holding shank, chamfer, and thread concentricity to very close limits, hole-accuracy is assured.



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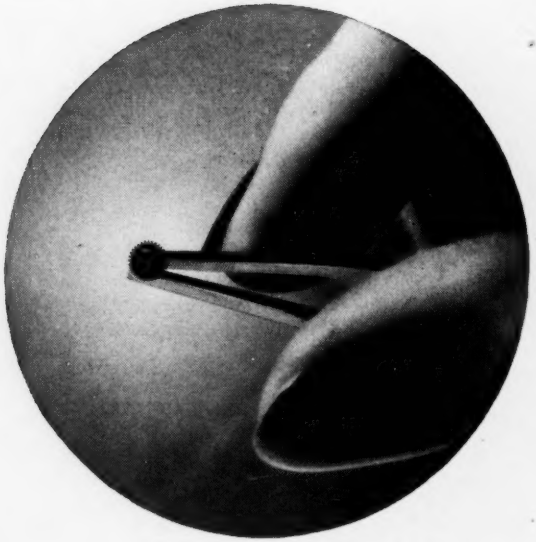

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The high production of accurate fine-pitch gears is a development of Barber-Colman Company. Special techniques have been developed for the manufacture of hobs as fine as 270 D.P. Fine-pitch hobs can be furnished from Class AA to Class C to meet your specific accuracy requirements. Multithread hobs are available for maximum production. In addition to hobs, Barber-Colman makes the machines to hob these fine-pitch gears. Most of these gears are cut on the No. 1-½ and No. 6-10 Hobbing Machines, but the Precision No. 6-10 is used for maximum accuracy.

As far back as 1936, Barber-Colman Engineers were making hobs and machines for cutting gears as small as ⅛" diameter and with teeth as fine as 160 D.P. Continuous development since this time has resulted in standard production techniques for gears up to 270 diametral pitch. Unground hobs are available to 270 D.P., ground hobs to 200 D.P., and carbide-tipped hobs to 150 D.P. Such tolerances as .0003" total composite error and .0002" tooth-to-tooth composite error are possible on gears of the finer pitches.

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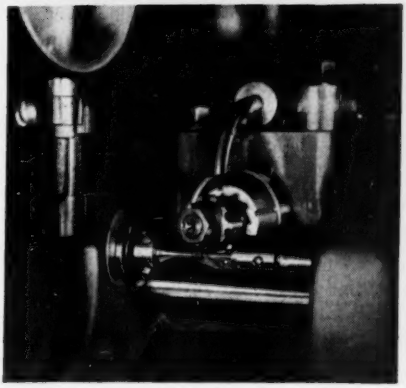
Typical of the range of fine pitch work in the plant of a large precision instrument maker, this hobbing job requires a good grade of commercial gear on a high volume basis. A battery of three Barber-Colman No. 6-10 Hobbing Machines produces 6000 gears per hour with 50 blanks mounted on an arbor. Close tolerances are consistently maintained at this rate of production. Fast loading and unloading is accomplished with air-operated tooling equipment. Here are the specifications: 50-tooth Spur Gears, 120 D.P., .422" O.D., .030" face in brass. Hob — 1⅛" x 1" x ½", Ground Multithread. Feed per revolution of work .020"; Hob Speed 1200 rpm.

180 D.P. Pinions

On another job, precision small pinions, .111" O.D. x .086" face, 18-tooth, 180-pitch are hand loaded and hobbed within a tolerance of .0003" on the pitch diameter on the No. 1-½ Hobbing Machine. Since extra fine finish is required a feed of .012" per revolution of work is used with an hourly production of 270 gears. Hob speed is 1795 rpm. A Barber-Colman ground hob, ¾" O.D. x ½" x .315", averages 850 pinions between sharpenings. Special tooling for magazine loading of the No. 1-½ machine is available as extra equipment.



When you require small gears, in pitches up to 270 D.P. in high volume production with close limits of tooth accuracy, call your Barber-Colman representative for assistance. With the precision and engineering built into Barber-Colman Hobs and Machines, he can help you reduce such problems to ordinary gear cutting procedure.

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HOBS AND MACHINES SINCE 1911

Machine Shop Rating of a Foreman . . . . .

By Robley D. Stevens*

Foremanship is now big business. Is your management securing the best talent?

Is yours one of the thousands of machine shops which spend thousands of dollars annually on bogus personnel training programs for supervisory programs? Do the experts bombard you from every side—try this, try that, and your foremen will be supermen? Well, if they do, perhaps your management will evaluate this article.

Robley D. Stevens

Because the foreman in a machine shop has traditionally been classified as part of management, workers consider him the boss, if not the absolute monarch in their relationships with him. Has the foreman in your machine shop lost his authority and prestige? Has his job been carefully defined by scientific studies as that of the rank-and-file worker? Well, if these things apply to your machine shop in general, management will undoubtedly recognize the need for a more scientific approach in determining the duties, responsibilities, and qualities of a foreman.

No doubt, the foreman's role in the management of a machine shop has altered from his previous managerial position. His functions today are primarily those of direction, training, and corrective action. Consequently, higher management must depend upon him for a knowledge of the worker and job and production conditions. He must be able to correlate the work of his department with advisory staff members as well as the workers. To accomplish this, a rating of a foreman is essential, if he is to be cognizant of operative methods and acquainted with the company rules, cost systems, and manufacturing methods. In addition, since the growth of widespread unionization, our national and state governments have passed an increased number of labor laws. As an official whose acts are imputed to be in accordance with machine shop company policy, the foreman must be familiar with the labor laws of the United States and of the state in which he is employed, as well as with the specific contract which the machine shop has made with the worker's union.

In my contacts with numerous foremen I have concluded that the average foreman in a machine shop tends to have closer working relationships with

* Management Consultant.

Name of foreman .....

Department .....

Selected and rated by .....

Date .....

Title of supervisory job to be filled .....

Period of employment of candidate .....

1. What have been the relations of the candidate with the workers with whom he has been associated? (Check one or more)
   ( ) friendly ( ) antagonistic ( ) leader ( ) reserved ( ) bossy
   Remarks:
2. What is the candidate's attitude toward his present job?
   ( ) shows initiative ( ) non-cooperative ( ) does minimum work—just enough to get by ( ) works hard ( ) highly cooperative
   Remarks:
3. How well does the candidate get along with top management?
   ( ) responds positively ( ) finds fault ( ) surly ( ) seeks favors
   Remarks:
4. How does the candidate respond to changes in duties or working conditions?
   ( ) has no complaints ( ) critical ( ) cooperative ( ) resists strongly
   Remarks:
5. Has the candidate supervised other workers?
   ( ) yes ( ) no
   If he has, how would you rate his ability to handle people?
   ( ) excellent leader ( ) shy and non-aggressive ( ) able ( ) discipline was poor among his workers
   Remarks:
6. How good is the candidate's knowledge of his job?
   ( ) active in keeping up with latest developments ( ) excellent ( ) average ( ) shows initiative in making improvements
   Remarks:
7. What is the educational background of the candidate?
   ( ) college trained ( ) high school ( ) special training ( ) other
   Remarks:
8. Is the candidate management conscious?
   ( ) has planning ability ( ) is cost conscious ( )has mechanical ability ( ) has teaching ability
   Remarks:
9. Does the candidate have good personal qualities?
   ( ) good character ( ) health ( ) nice personality ( ) enthusiasm ( ) self-control ( ) ambition
   Remarks:
10. Miscellaneous factors
    The candidate ( ) drives his men ( ) is lax in discipline ( ) is liked by employees ( ) likes to supervise ( ) meets deadlines ( ) assists workers in improving their performance ( ) accepts responsibility
    Remarks:

Salient information needed on job performance and supervisory aptitude in order to evaluate the candidate. Outstanding performance as a worker does not guarantee an even satisfactory performance as a supervisor, because of the difference in duties. Check as many phrases, one or more, for each question. Then, supplement these checks with any examples that you can furnish, and with any other information that will aid in the selection and rating.

production workers than he has with higher management. Often, he is much better acquainted with the union side of industrial relations than he is with the management side. Why? Well, surveys indicate that the foreman and the laborer work and talk together throughout the day and may spend their social hours together. However, through lectures, periodicals, books, and parties, some machine shop managements have eulogized the part played by the foreman as member of their team.

From the early beginning of the defense program of 1942, thousands of foremen have been employed by machine shops. Because of extentuating circumstances, many have been quickly hired and promoted up the ladder in order to assist management with its existing output. In many cases, neither the foreman nor the management of a machine shop has had the opportunity to familiarize himself with the other. Consequently, the status of a foreman or his rating has invariably not been clear.

True that a foreman in a machine shop enjoys a good salary, hours, and working conditions, among other "fringe" benefits. This all may be entirely satisfactory to the foreman, but what about management? Is your management rating its foremen adequately to secure the maximum results for the expenditure? Should this responsibility of rating a foreman fall

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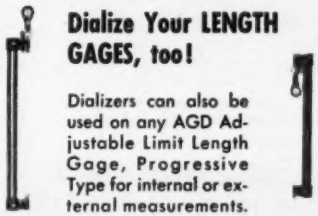

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within the purview of the personnel department? Or, should top-flight management handle the problem? Although some machine shop executives have been prompt to back and rate a foreman, in many cases others have failed and/or neglected.

It goes without saying that a competent foreman must possess considerable technical "know-how" and mechanical experience. In addition, a foreman in any machine shop must be a leader of the workers simply because the human element cannot be overlooked. Mere symbols or titles do not make a successful foreman if he is a part of the machine shop managerial structure. Nor do telephones, desks, or parking spaces.

Well, how can machine shop management solve the rating problem of a foreman? In the first place, it is vital that the skills and abilities of all foremen be fully utilized. The burden of effecting this falls squarely upon management. If a foreman is inefficient, full utilization of workers is licked from the start. For these and many more bona fide reasons, a systematic program of supervisory selection and rating has become a necessity in the machine shop.

Good supervisory selection and rating are important, but if it is not supported by good supervisory training, it may substantially be nullified. However, giving supervisory training and

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rating to those who lack the personal qualities and abilities needed is almost like watering a garden where nothing has been planted.

All machine shop management is concerned with costs. Inadequately trained and rated foremen can be costly. And it's not essential to engage outside counsel to train and rate a foreman, because there are numerous books on the subject which any machine shop management can utilize toward this objective.

A good foreman is not a rare bird. All the workers can describe him pretty well in a general way. The descriptions may vary considerably, depending on who's talking and to whom and on the particular person being described. Whatever the description, however, there is no doubt about it that the foreman is the pivotal man upon which machine shop management and operations turn. This fact has been increasingly appreciated in recent years.

In the light of these observations, it may be said that a systematic, purposeful approach to supervisory selection and rating is the rule today because both pay off big dividends for management. Why? Well, in the first place, it uncovers supervisory talent which otherwise might never be discovered or recognized. Even in a small machine shop persons with good supervisory potentials may be overlooked; in the large machine shop organization, the risk of this may be substantially magnified. Therefore, a systematic selection and rating program will spotlight supervisory talent obscured by any of the above factors.

Furthermore, systematic supervisory selection and rating programs help to bolster a worker's morale in

two ways. First, since morale is to a great extent dependent upon the quality of the supervision, the fewer incompetents machine shops have, the better morale will be, other things being equal. More directly, the knowledge that a definite program is in effect relieves the anxiety of workers that they may not get the recognition they merit and that others, less worthy, may get preference. And it all salves the wounds of workers disappointed in their expectations of a promotion to know that their abilities were considered, that they didn't lose out because somebody "had it in for them," and that they can try again for the next opening.

Moreover, a systematic supervisory selection and rating program speeds up the process of filling vacancies by an advance evaluation of persons who are eligible so that all the preliminary work is finished and available when a selection and rating must be made. While this requires advance planning, it will pay off, not only in making immediately available the names of those who should be considered, but also in making it possible to train and rate those employees who are most promising while they are waiting to be considered by shop management for the appointment to a foreman.

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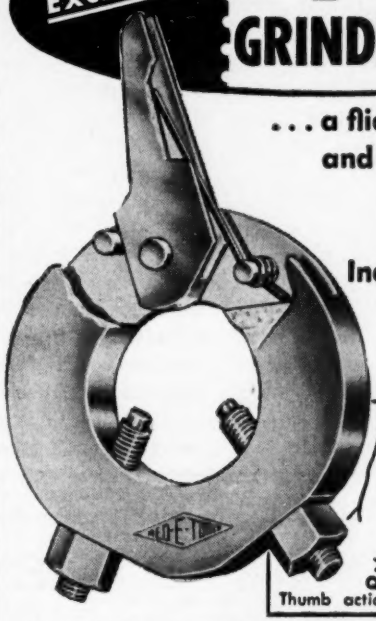

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Perhaps the "self-rating" and selection chart on page 153 might be utilized by machine shop management and a foreman. However, it should be realized that it is an easy matter to rate a machine by measuring instruments designed for this purpose. In the case of selecting and rating a foreman, psychologists and personnel men agree that there are certain behavior patterns which provide the observer with a basis for evaluating a foreman's strength and weakness. It is believed by the writer that the traits and abilities listed are necessary when selecting and rating a foreman. Then, too, there are other scientific procedures which may be utilized by those intimately acquainted with a machine shop foreman and his job.

Too often people think of the successful individual as the head of a corporation, scientist, writer, lawyer, accountant, and so on. Yet the fact remains that a foreman in a machine shop can be successful if he has been properly selected and rated. It is all based upon action, uncovering one's hidden talents.

Why is it that one foreman is a success and another a failure? Well, only management and a foreman know why in this case. After all, supervisory positions differ in many ways. The nature of the work being performed under the supervisor's direction may be responsible for some differences. However, complicated and highly technical work in a machine shop, for instance, requires that a foreman be well selected and adequately rated.

In summary, practically every thing that a machine shop foreman does is an act of leadership. He leads by setting a good example; he leads by assisting each worker to overcome any difficulties he may be having; he leads by planning and controlling the work of his unit; he leads as a result of adequate supervisory selection and rating. By careful delineation of the background and characteristics needed for a supervisory job, one can eliminate at this stage many undesirable persons. Evidence is available from many scientific and practical studies that this method has a high degree of validity. However, continuous research is also needed to improve the selection and rating of a machine shop foreman.

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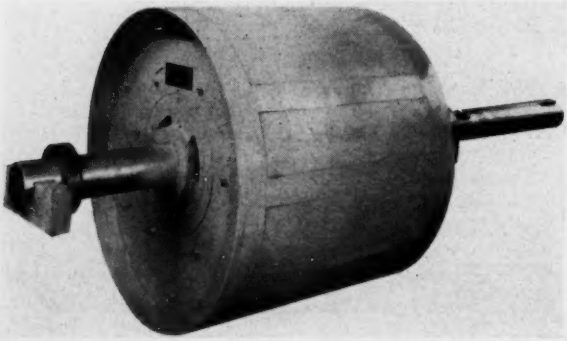

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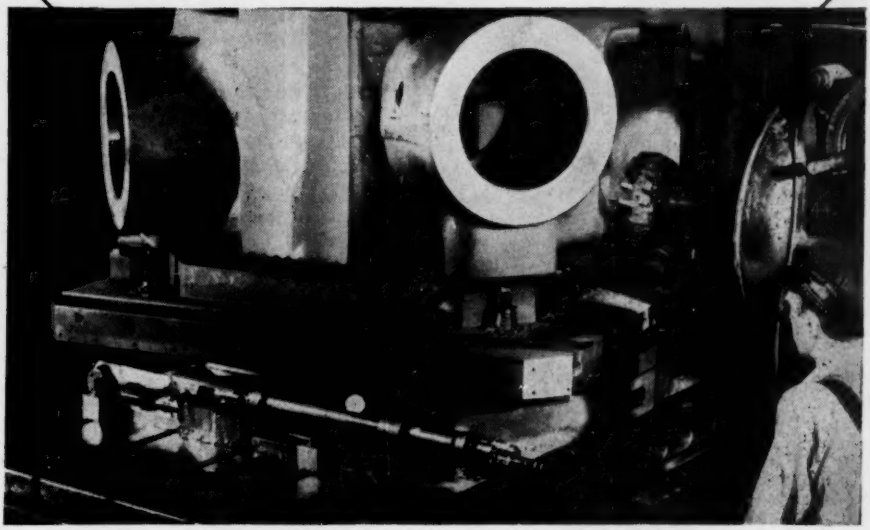

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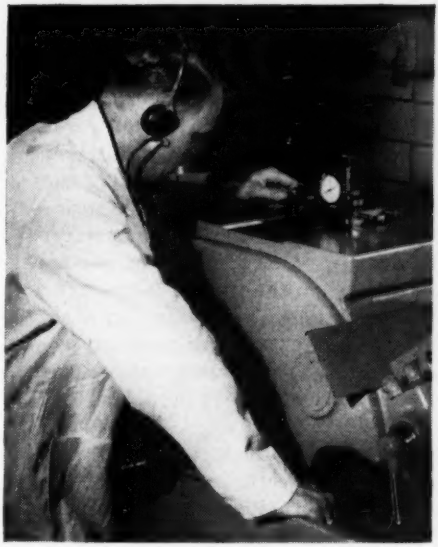

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Machining Fixture with Self-Centralizing Clamp

By W. M. HALLIDAY

The author describes an interesting device for accurately holding hollow box-like iron castings while machining various surfaces.

WHERE workpieces have to be drilled or milled on certain surfaces within close precision tolerances, difficulties are frequently encountered with regard to locating and/or clamping the workpieces accurately and quickly within a milling fixture or drill jig. Such difficulties particularly arise in the case of large hollow box-like iron or brass castings which are to be left unmachined on external sides and which normally are too large for total enclosure within the usual types of box jig.

To facilitate the location and retention of such workpieces, it is customary design practice to provide a number of cast-on lug or boss projections at selected points on the external walls of the part, as shown at **X** in the accompanying sketch. Such lugs are employed for both locating and holding the work in the fixture by arranging the clamping screws or other members to bear against the sides of these projections.

One of the simplest methods for accommodating such lug locators in the milling fixture is to equip the body of the latter with a series of projecting pins, arranged in pairs, with the space between each such pair being carefully determined to allow the respective lug on the workpiece to be freely admitted. By using three or more pairs of locator pins, the workpiece can be quickly aligned relative to the cutters or other portions of the jig.

Provided the width dimension of such lug projections can be maintained closely the same on all parts, little difficulty will arise in practice. With rough castings, however, this will rarely be the case, short of introducing a special machining operation to true up the sides of all locating lugs and bring their overall width to exactly the same dimension. With ordinary iron castings, such lug widths may vary a considerable amount from casting to casting over a large quantity; for example, such variations may range up to 0.030 inch. Moreover, the critical sides of the rough cast lugs which will have to make close contact with the sides of the locator pins in the fixture will often be very irregular due to the presence of scabs, seams,

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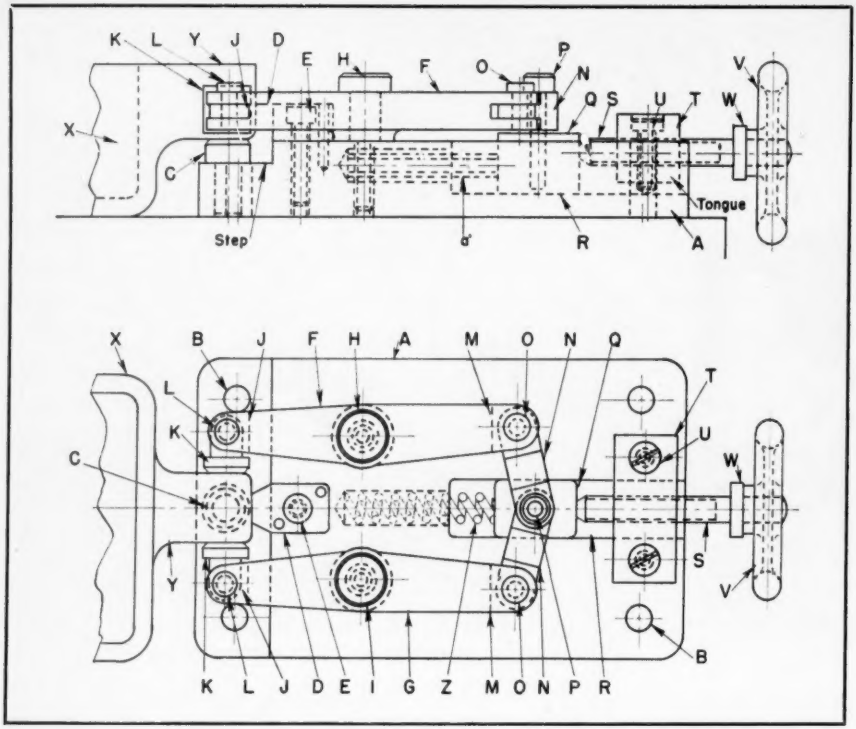
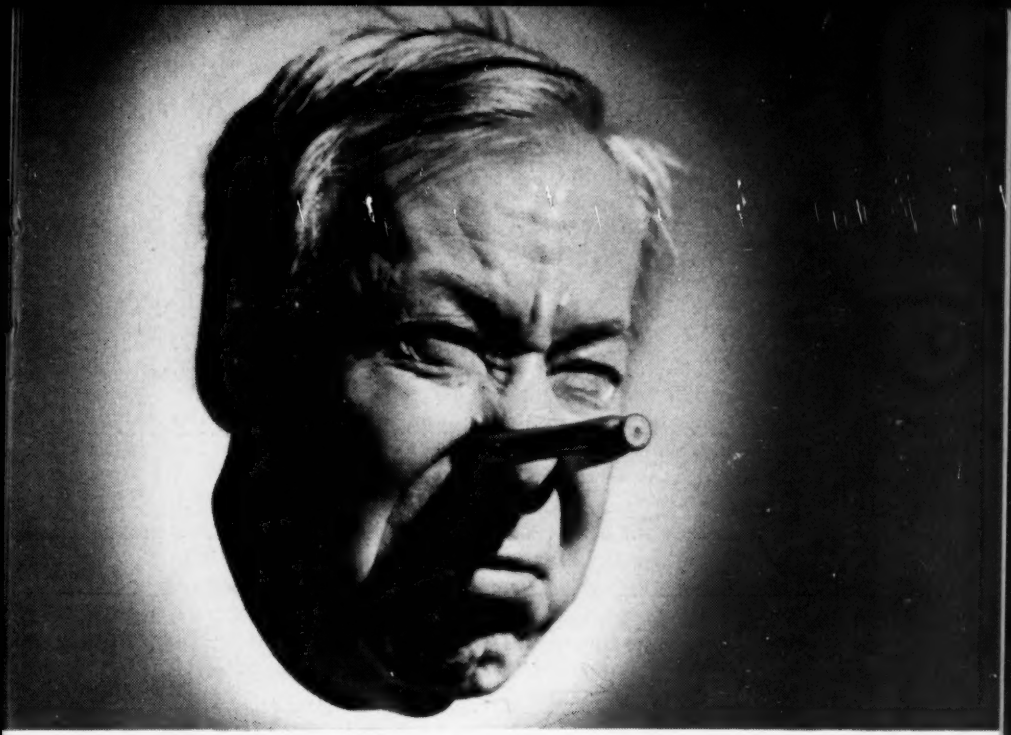


Sketch of machining fixture with self-centralizing clamp for holding large hollow box-like iron castings

laps, fringes, and similar irregularities occurring with castings.

Because of such unavoidable variations, it will be necessary to situate the locator pins in the fixture a sufficient distance apart to admit a lug of the maximum width encountered in a batch of castings. This will mean that a considerable proportion of the castings having narrower lug widths will locate within such pin spacers with a certain amount of play. This play will often be of such magnitude as to allow the entire workpiece to be incorrectly positioned relative to cutters; thus, errors may easily result in positioning of the machined portions and in their sizes.

To avoid these errors and incorrect setting, it will be essential for the operator to take special care when mounting workpieces in a fixture of this type. In the case of parts having lugs of excessively narrow width, undesirable sideplay will be eliminated by the introduction of suitable packing strips on each side of the affected lug. Application of such packings will result in further setting delays and lost machining time.



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Where the workpiece is to be held in the fixture by gripping directly against the sides of such cast-on lugs, the use of packings as described may prove somewhat hazardous with regard to the scale of gripping pressure obtained and the maintenance of same throughout the machining operation. For instance, such packings may prevent the locking screws or clamping fingers of the fixture clamp from bearing against the sides of the lug with sufficient force to withstand cutting pressures on the workpiece. Thus, the packing strips might easily vibrate loose and fall out of place during machining, thereby allowing the entire casting to move slightly out of place. The critical portions being machined would, therefore, be finished to an incorrect size or distance from other portions. On the other hand, accidental disturbance of the work while cutting would involve some risk of seriously damaging cutters or fixture parts, as well as producing errors in the finished casting.

To avoid all of these undesirable possibilities in connection with the location and retention of a large size hollow box-like iron casting such as shown at **X** in the sketch, a special milling fixture was designed to hold such parts. The unusual features possessed by this design of fixture will doubtless prove of interest to jig and fixture designers, since the principle has wide application.

An internal wall of this casting had a seating which was to be machined with a deep slot, the latter having to lie exactly central with lug **Y** on all

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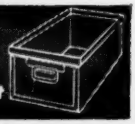

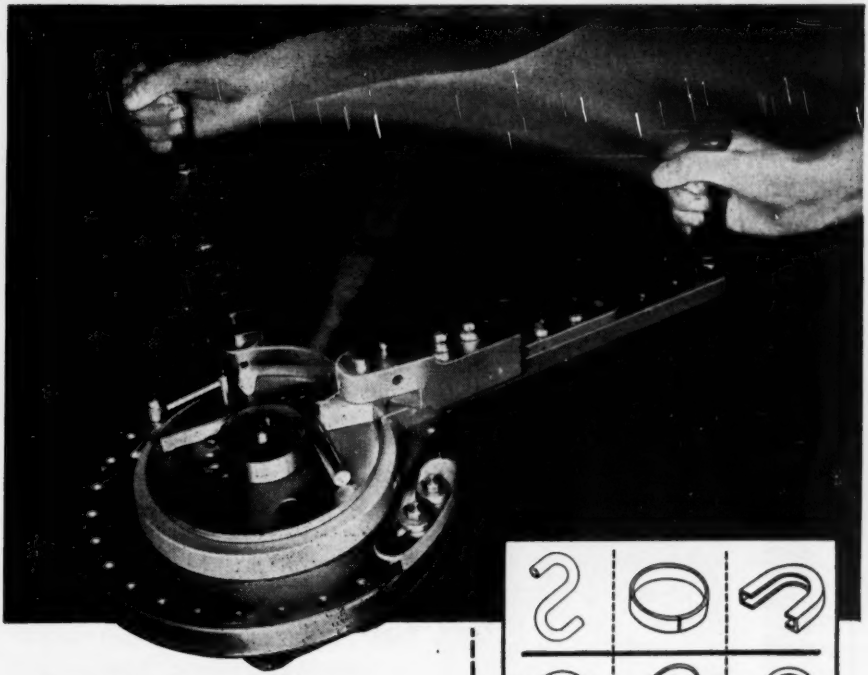

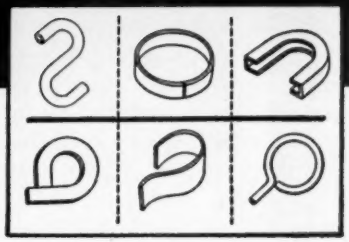

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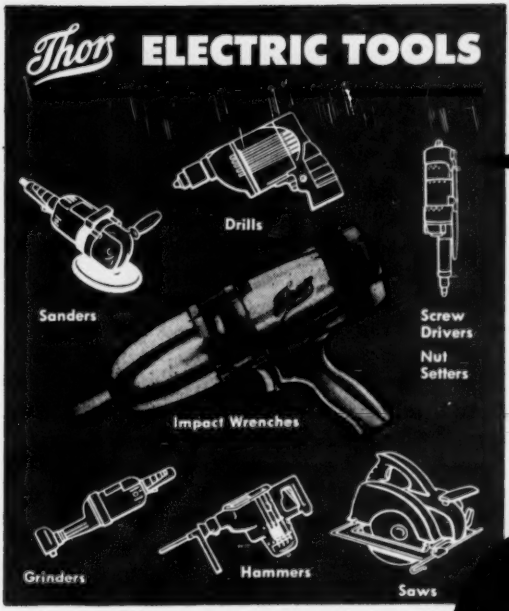
components, regardless of variations occurring in the widths of lugs over a very large quantity of parts. This seating is omitted from the sketch, which is chiefly concerned with showing the clamping and centralizing features of the fixture. The device is provided with two simple clamping fingers for gripping the opposed sides of the relevant lug **Y**, the fingers being so arranged as to centralize the work by accommodating themselves automatically to any variations occurring on lug widths from part to part.

Referring to the sketch, **A** is a stiff-sectioned rectangular cast iron base plate, machined on the top and bottom surfaces so as to be parallel. The corners of this member are drilled as convenient for the hold-down screw holes **B**. A shallow flat-bottom step is machined across the top left-hand end of the base plate as shown. A hardened steel headed stud, **C**, is located permanently in this stepped portion, the head of which is the required height to suit thickness of the lug **Y** which should rest on top of the stud as shown when the base of the casting is slightly clear of the machine table. The lateral position of the casting is determined by the fixed block **D** which is secured by screw **E** and two small dowels to the top of the base plate **A**. The underside of this block, which normally overhangs the stepped portion on the base plate, is relieved to obviate any pocket in which chips may lodge.

The two fingers **F** and **G** are hardened steel, being identical in size and shape, and are situated one at each side of the lug **Y** in the manner shown. These members are pivoted to swivel freely upon the headed studs **H** and **I** respectively, which are tightly screw-



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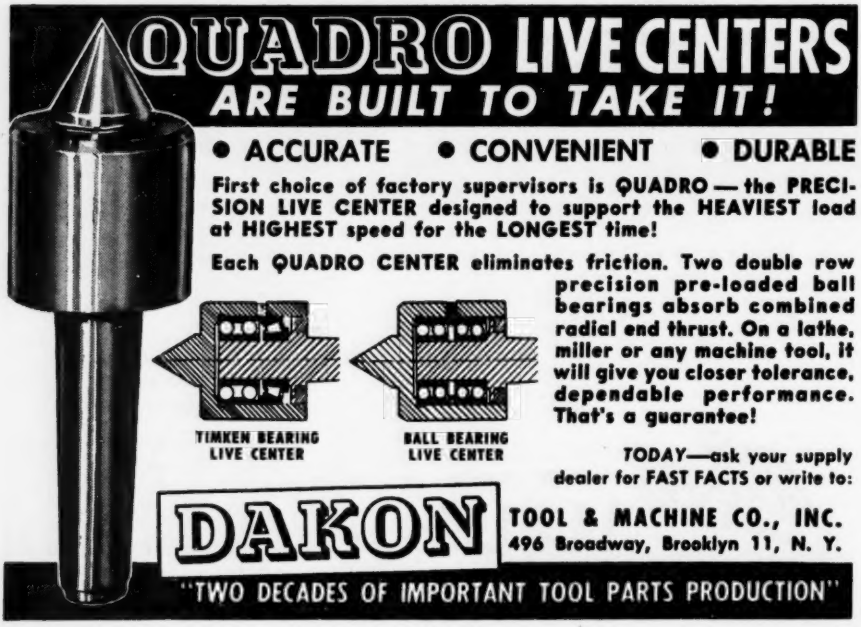
ed into the top of the base plate.

The left-hand end of each finger is slotted centrally in the width for a certain distance as indicated at **J**. Fitted into such slot is the tail end portion of the hardened clamping pad **K**, the two being fulcrumed together by means of the headed pin **L**, the latter being retained in the finger by a small cross-located pin. Pads **K** and pins **L** are exactly the same size and shape. The pads thus mounted should be free to swivel for about 10 degrees each side of the center axis in the horizontal plane. Such movement is necessary to allow the pads to adjust themselves most readily to any slight variations in the shape of the sides of the lug being gripped.

The opposite end of each finger member is similarly slotted, as at **M**, to receive the reduced ends of the steel toggle links **N**. These links are also identical in size and especially in regard to the hole center distances. The lower link **N** is reduced in thickness at its opposite end to permit this portion to pass easily within a slot machined in the end of the adjacent link. Both links are cross-drilled for the headed stud **P**, about which both are free to swivel.

Stud **P** is situated perpendicularly within the hardened steel slide **Q** which is closely fitted to move along the parallel guideway slot **R** machined in the top of the base plate **A**. The slot is machined exactly central with the center axis **x—x** passing through the center of lug **Y**. Stud **P** is also located on this same center.

The lengths of links **N** have to be carefully determined so that these members will be inclined to each other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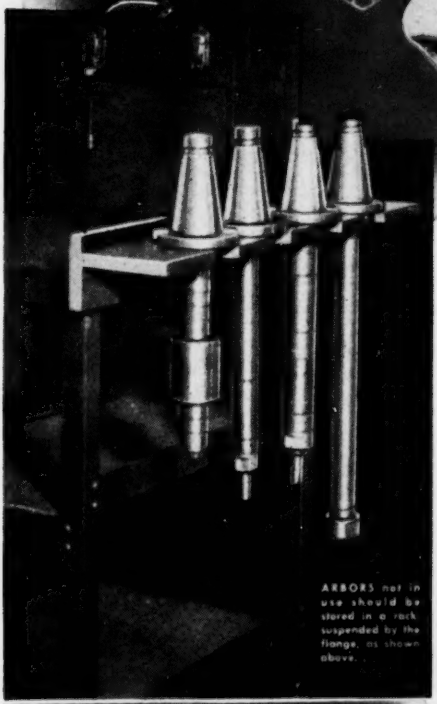
in slight degree when the clamping pads **K** are in contact with the sides of lug **Y** on the work, as shown.

Swiveling movement is imparted to the finger members **F** and **G** when gripping a workpiece by means of the screw **S** which is threaded through the mild steel block **T.** The latter member is made T-shaped, having a tongue portion on its underside which is a tight press fit within the guideway slot **R.** The latter, it will be noted, is extended completely to the right-hand side of the base plate for that purpose, thereby ensuring accurate transverse alignment of the block. The block is secured in place against endwise movement by two cap screws, **U.**

For actuation of the screw, a small light alloy handwheel, **V,** is located on the shank at the extreme right so as to fit against the integral shoulder **W.** A small cross-located pin serves to hold the handwheel in place .

The left-hand end of the screw normally situated in the slot **R** is well chamfered and hardened and bears against the end of the slide **Q.** By adjusting the screw, the slide may be moved toward the left under high pressure by a simple quick turn of the handwheel, thereby causing the finger members to grip the work lug. To ensure quick return of the slide and instant opening of the fingers on releasing the workpiece, a stiff coiled spring, **Z,** is interposed in a blind hole in the left-hand end of the guideway slot. This spring bears directly against the left-hand side of the slide, so that as soon as the screw is retracted, the slide is urged to the right.

The method of operating this simple self-centralizing clamping fixture will be clearly understood from the sketch, which shows the workpiece **X**



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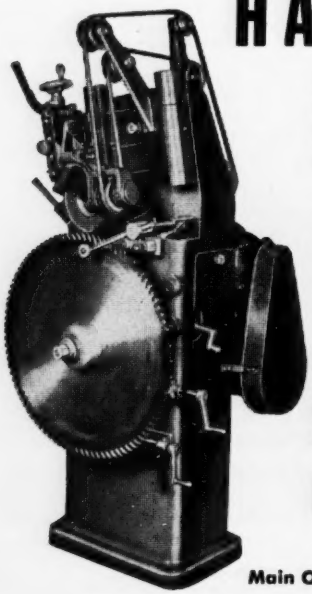
clamped in the milling position by means of lug **Y**. It will be appreciated the fingers **F** and **G** will be swiveled in opposite directions but for exactly the same radial amount when the screw **S** is advanced into the slide slot. Thus, the clamping pads **K** will always be disposed the same distance each side of the center axis **x—x** and thus will automatically grip the work lug to hold it central with that axis regardless of its width.

By means of the short connecting links **N**, a toggle action is obtained to move the opposed fingers, and the pressure exerted by the screw will be considerably magnified to provide a powerful grip on the work. The maximum width of opening between the two fingers and clamping pads will be determined by the lengths of the links **N** and the overall lengths of fingers **F** and **G**, as well as the disposition of the fulcrum studs for the latter.

With the present example, an opening movement of $\frac{5}{16}$ inch is readily possible, this being far greater than the maximum variation occurring on the width of the unmachined lugs. The sketch shows only one such fixture clamping arrangement; however, two or more identical clamp locators will be employed, located at the respective sides of the workpiece.

Normally, the entire clamping device as shown will be fastened to the body of the milling fixture for greatest convenience; alternatively, two or more such devices may be fastened directly to the machine table, and thus, in some cases, may obviate the need for a special fixture casting, and so on.



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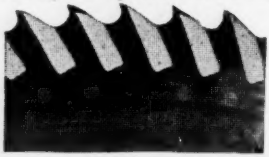

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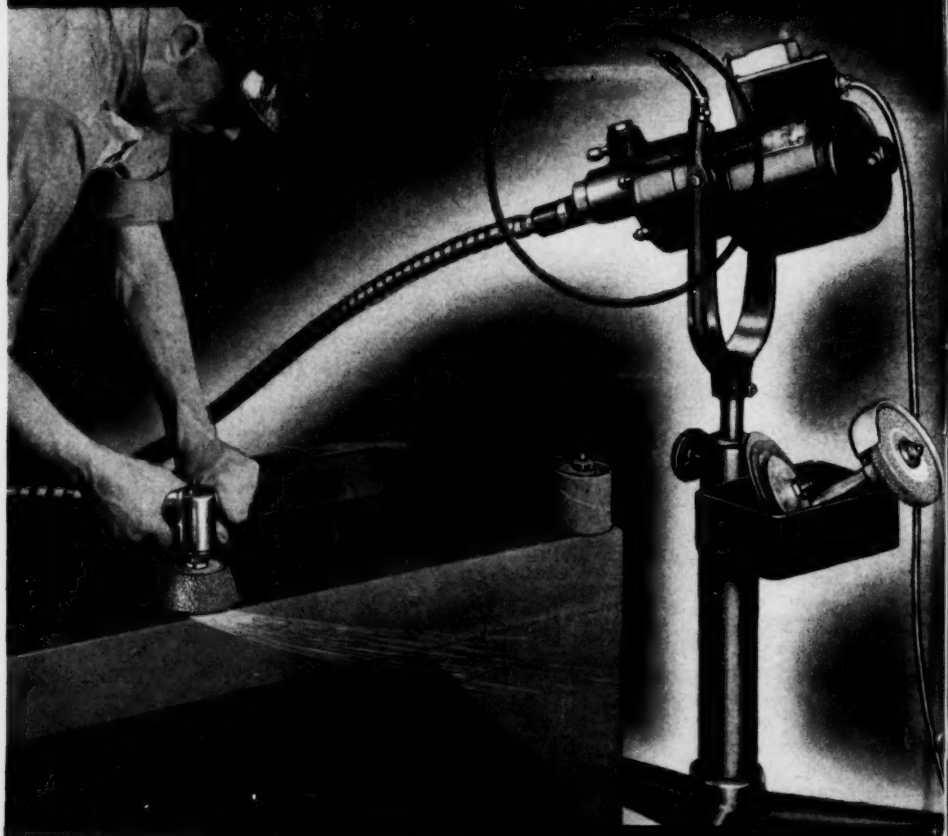

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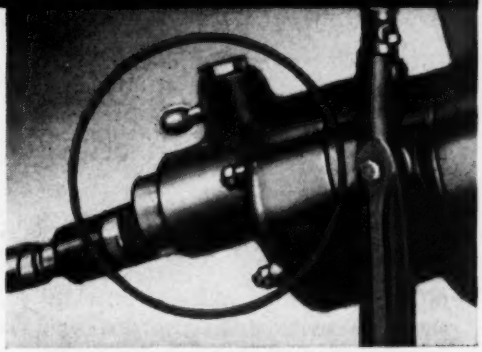

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Precautions with Precision Measurement

By C. W. KENNEDY

In which the author offers helpful suggestions on the use and care of precision gaging instruments.

NOWADAYS metal working shops are facing increasingly the requirement for extra precision manufacture and, consequently, extra precision measurements. Where, a decade or two ago, holding a tolerance of .002 in. was a mark of master craftsmanship, tolerances of .0002 in. are common today on blueprints, and you find engineering designs that call for the tenth of a thousandth to be split into parts.

These narrower margins focus attention on the accuracy and wear of gages, masters and Jo blocks. If a half inch conventional plug gage is to be used on parts with .0002 in. tolerances, for instance, the gage maker's allowance of 20 millionths (.0000020 in.) for this size plug in the XX, AGD grade immediately uses up 10 per cent of the working tolerance in the component.

With tolerances under .001 in., results from the use of micrometers, fixed snaps and plugs, or vernier equipment become questionable because of the variation in the sense of touch among different mechanics, as well as degrees of inability to read verniers consistently, even though the instruments themselves may be accurate. Shops facing extra precision work logically turn to indicating gages because they largely overcome the effects of human error by the very nature of their design and action. Nevertheless, it is difficult to completely outguess mankind and even with the most foolproof equipment available some work-

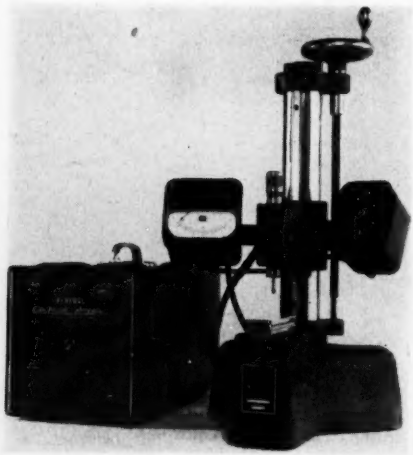

Fig. 1 — Illustration showing electronic gage setup. Amplifier at left provides for quick change from one amplification to another.

Fig. 2 — Electronic gage may be used in checking cylindrical masters against Jo blocks, as shown here.

ers display a diabolical knack for finding the wrong way to use an instrument.

Supersensitive indicators using mechanical means for amplification (gear trains, reed mechanisms and the like) are available which can accurately detect workpiece size variations of half a tenth (.00005 in. or 50 millionths). The air gage has a similar capability or discrimination which has made it especially valuable in measuring precision I.D.'s because, simultaneously, it is fast, accurate, and requires no unusual manipulating technique.

For distinguishing size variations below 50 millionths, gages have been devised which employ electro-magnetic means for amplifying the measurement and transferring it to what is fundamentally a voltmeter scale. In general, in such instruments, the movement of a gaging contact or spindle, no matter how minute, creates an electric impulse or an alteration of resistance, reactance or capacitance in some manner that registers on the sensitive voltmeter. Transferring the displacement of a gaging contact and amplifying it electronically, offers the advantage that there is nothing to wear loose and inaccurate in the course of time in the electric system.

The electric type gage, however, is liable to display an inaccuracy and a disadvantage which is many times overlooked. If, between the time it is mastered and the comparative measurements are being made, the house supply voltage to which it is connected happens to vary a little, the indicator or meter readings can be inaccurate. In other words, an electric gage set and mastered at 110 volts may not give a true size reading if the voltage has dropped to 108 volts, say, by the time the workpieces are being measured. It pays to constantly recheck an electric type gage with the master.

Then, since World War II, electronic systems, circuits and principles have been brought in to use for transferring and amplifying gage contact measuring motion to an indicating scale. Virtually the same sort of devices, circuits and principles that will pick up sound waves and the slightest changes in vocal inflection from a microphone, carry it over wires, amplify it on a radio set, and reproduce the sound at a loud speaker have been installed in precision measuring instruments.

Electronic gage circuits offer several advantages over what might be called the conventional electric schemes. Their accuracy of transmission is relatively unaffected by normal supply line voltage fluctuations. Ordinarily, supply voltage can vary up to 10 per cent without materially changing the fidelity of the instrument. The

Fig. 3—Illustration showing master comparator which is designed especially for checking I.D.'s.

electronic gage gives dependable readings way to either end of its linear indicator scale—that is, it is reliable to the extreme limits of its designed range. Through an electronic system, amplifications can be stepped up so that size variations in millionths of an inch can be read on the meter scale.

The electronic setup also allows a ready shift from one amplification to another. The amplifier pictured in Figure 1 shows a switch knob at the lower left hand corner of the amplifier. With this particular equipment, plus the double scale meter or indicator, the inspector can check work in a ± .003 in. range or with tolerances of ± .001 inch. By clicking the amplification switch over still further he can measure accurately between ± .0003 in. or ± .0001 inch. On the ± .0001 in. setup, for instance, each meter scale division gives a direct reading in terms of ten millionths of an inch. By special order on the gage manufacturer, the electronic gage can be adapted to cover tolerance spreads like ± .010 in., for example, or, at the other extreme, the circuit can amplify to a point where an indicator dial division will represent a size difference of one millionth.

The shop that is entertaining fine tolerance manufacture has, then, available on the market rugged, practical, dependable instrumentation designed to take care of its measurement problems adequately. But there are other factors and precautions in connection with precision measurement to which the shop organization must pay attention. So many times shop supervision feels that the purchase and installation of the correct gage is all there is to it. The attitude oftentimes resembles the sentimental atmosphere at a wedding—all you have to do is get the couple married and they will surely live happily ever afterward!

In addition to the direct use of supersensitive, high amplification gages on precision work where it is being manufactured, extra dividends on the investment can be collected by using such gages to check and verify other measuring equipment. On the job in a

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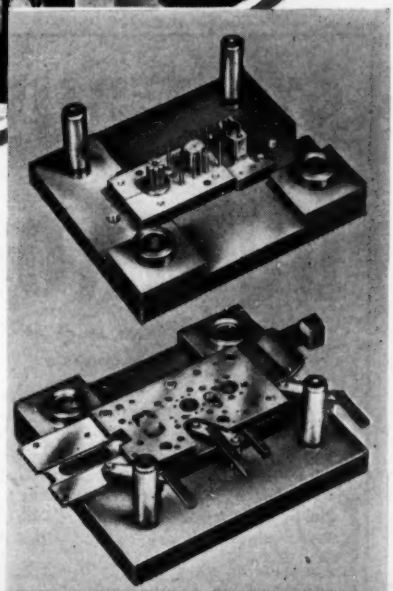

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shop struggling with close tolerance manufacture they should be used perhaps to check every new plug gage and cylindrical master whether they are purchased or made in the tool room. Even new plugs are liable to show forty or fifty millionths taper or ovality, for example, and sometimes more—enough deviation to gag in workpieces which happen to be right on the specification line.

And it goes without saying that plugs and masters used out on the floor should be regularly checked. Somebody always knows, but seldom ever tells, when a plug or master gets dropped on the floor, and there is no good way of foretelling exactly that instant when a plug seems suddenly undersize. While the modern shop logically turns to regular indicating gages, as it edges its way into close tolerance work, the same narrow product tolerance can be eaten into unless the gage maker's tolerances and the amount of wear on master plugs and rings used with indicating gages are similarly known.

The electronic gage, whether used for external or internal measurement, is always a comparator—direct reading only over a limited range—which means that in regular practice the size of any shop plug, ring, master, or gage is determined by comparing it with some other plug or master of known size. Almost without exception, the basic, comparative measurement master is the gage block, all makes of which are still often referred to as Jo blocks. Figure 2 illustrates the checking of cylindrical masters against Jo blocks.

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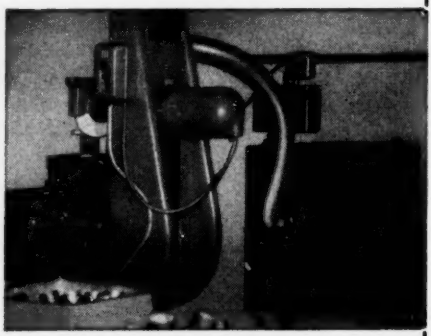

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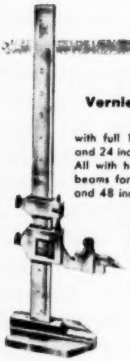

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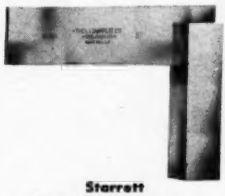

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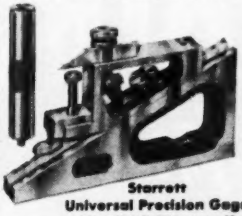

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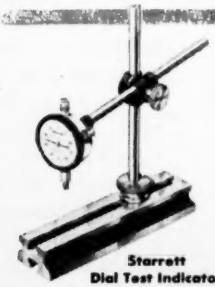

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are rechecked and calibrated by their manufacturers or the Bureau of Standards at least once a year. Such a set of blocks is used exclusively for comparator settings for the routine checking of shop and inspection gages. Then again, other shops, realizing that Jo blocks too develop unsuspected wear, know they must themselves be regularly calibrated. For this purpose, they stock what might be called a "super" master set which is touched solely to calibrate so-called "master" sets of gage blocks—the latter, in turn, regularly used to check masters, plugs, rings, and shop or "working" gage block sets.

The process of calibrating gage blocks by spectrometry or optical flats is at best a time consuming, rather ponderous operation, which can also be ineffective and inaccurate unless the inspector knows exactly what he is doing. A suitable electronic comparator, on the other hand, can be set to any one of these "super" master gage blocks in a second or so and, in another few seconds, the suspect block can be measured, compared, observed for parallelism and its surfaces explored for flatness. And the inspector need not be a highly trained technician.

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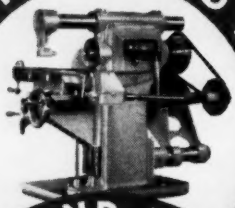
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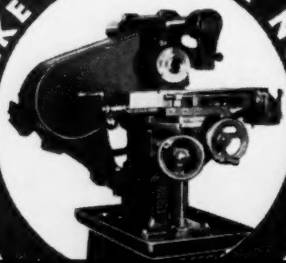

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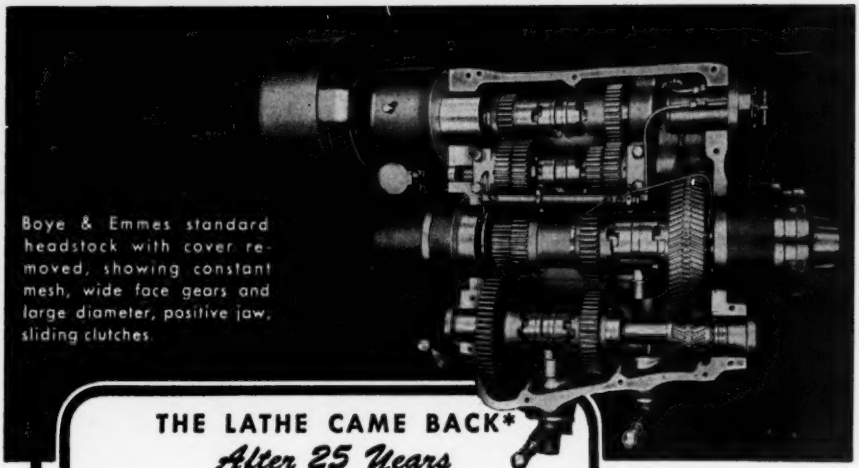
lapping close tolerance I.D.'s, even greater use is made of indicating gages. Such have to be set with master setting rings. Now, ring gages are often the neglected stepchildren of the master family basically because to size check a ring, in terms of millionths, is, or has been, a somewhat difficult chore for the average shop.

Subconsciously then, the neglect is rationalized by letting ourselves believe, somehow, that master rings (like old soldiers perhaps) never wear out. It seems easier to comprehend why a plug or gage block can become nicked, corroded or worn but for some reason it is harder to believe a ring is off size. Yet a careful check of a high priced, beautifully finished, X grade ring is quite likely to show it tapered, bell mouthed or oval, or with a hole that is barrel or hour-glass shape. The importance of checking rings, or any type of master, should be emphasized by the fact that, whether it is the right size or wrong, whether it is worn or misshapen, it becomes the specification, rather than the blueprint, so long as it is out on the job.

Figure 3 illustrates one type of electronic equipment—a master comparator—which, while it will measure O.D.'s satisfactorily, is specially designed for checking I.D.'s, if necessary to millionths of an inch. Apparatus of this nature contains provisions which permit its operator to readily observe several precautions absolutely necessary in extra precise measurement.

The scraped flat gaging table can be lowered or elevated after the ring is in place over the measuring contacts. This permits exploring the length of the hole without handling the measured piece with the hands and warming it up. An ingenious locking



Boye & Emmes standard headstock with cover removed, showing constant mesh, wide face gears and large diameter, positive jaw, sliding clutches.

THE LATHE CAME BACK*

After 25 Years

HEADSTOCK GEARING "GOOD AS NEW"

Boye & Emmes Engine Lathe No. 300-141, owned by The Timken Roller Bearing Company, Canton, Ohio, was returned for factory inspection after twenty-five years of day-in-day-out use. During this period, Timken purchased repair parts from us, for this machine, to the extent of $154.15. Yet, when the headstock cover was removed at the factory the gearing was found to be "as good as new." This is usual.

CONSTANT MESH GEARS POSITIVE JAW SLIDING CLUTCHES SPELL OUT THE ANSWER

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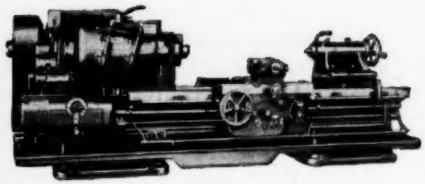

*One of many documented cases of "no wear" in Boye & Emmes constant mesh lathe headstock, after years of use.

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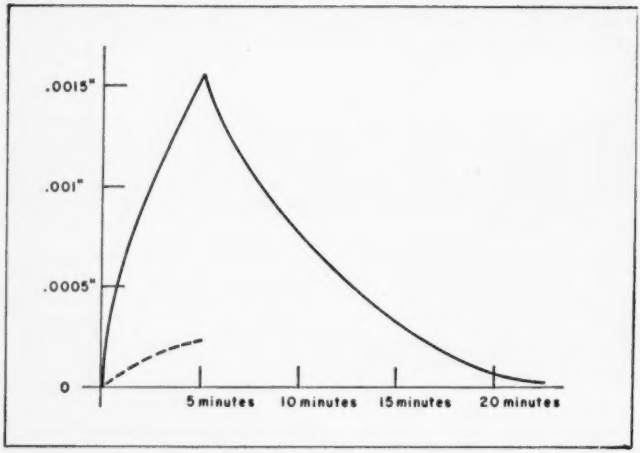

Fig. 4 — Solid line curve shows number of thousandths that a 42-in. caliper expanded when held in two hands for five minutes and then allowed to cool. Dotted line curve shows expansion of same calipers when handled with wool felt pads.

mechanism maintains the same gaging pressure applied to the comparator when it is set to the gage block master, through the transfer from blocks to the ring or master being checked. Consequently, varying deflection in contact arms is eliminated. For similar purposes of securing error-free measurement, the contact arms are also mounted on a leaf spring suspended, full swinging carriage.

Even though the gage maker has taken stock of many precautions required in super accurate measurement and has drawn on his ingenuity to incorporate foolproof features in his apparatus, the user or inspector, on his part, must be vigilant about a number of conditions which can prevent his getting precise measurements no matter how well qualified the gage. For high precision work the matter of temperature control is important. Then there is the subtle effect of vibration. Certain common, human errors in manipulation are to be avoided; strangely enough, many times, the simplest geometrical principles are transgressed. Also peculiarly, too little attention seems to be paid to ordinary, everyday dirt and dust.

As far as temperature control is concerned, the common thought is an air conditioned room so-called, a room in which the temperature is assiduously maintained at 68 deg. come what may outside of the room.

Basically, what is required of temperature in extra precision measurement is a **static** temperature condition. Since the dimensions of a piece of metal fluctuate with temperature changes, the 68 deg. (F) standard temperature was designated, as is well known, the official base for naming the correct size of a piece. In other words, if a gage block is officially registered as 1 in. + .000002 in., the document means it was this size at 68 degrees. If, however, the block is to be used to master a comparator for checking a 1 in. plug, it makes no practical difference if the comparison is made at 78 deg. provided both the master block and the 1 in. plug are at 78 degrees. Temperature would affect the measurement where the comparator was mastered with ths gage block in a 78 deg. temperature, say, and then where it was used to

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check the plug after the temperature, had suddenly dropped to 72 degrees.

The condition just implied can come about very readily when someone innocently opens a nearby window, on a winter day, and lets an unobserved draft of chill air blow against the gage and the plug just after the gage has been mastered. In a poorly designed 68 deg. air conditioned room the same difficulty has been noted where the location of one of the cooling system outlets beams chilled air directly against an instrument. In another situation, the room was carefully kept at 68 deg. but the instrument was located beside a window which, in a manner, focussed a shaft of direct sunlight onto the gage.

A high precision gage should be located and/or sheltered so as to be surely insulated from drafts, nearby radiators, direct sunlight, the casual opening and shutting of a nearby annealing furnace door perhaps, or even from the reflection of a high wattage lamp bulb in a reflector directly overhead. Precautions of this nature are often more important to accurate measurment than a temperature controlled room.

The professional inspector usually zeros the gage to the master—an approximate but close setting—and then places the workpiece on the gage anvil so that it also has metal to metal contact with the master and leaves all three for at least twenty minutes for the temperature to "settle" or for the temperature of gage, master and workpiece to equalize with each other. In taking the actual measurement, he moves as swiftly as possible to neutralize any effect of body temperature

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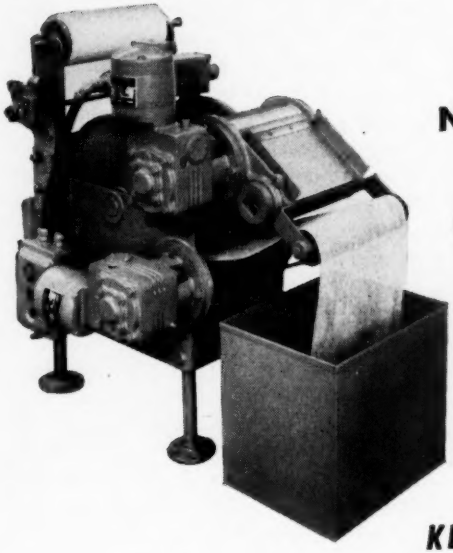

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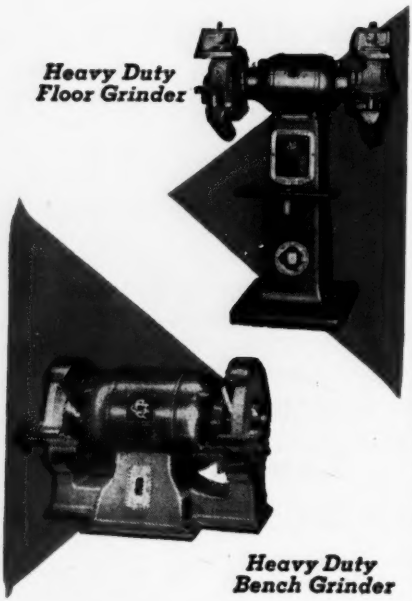

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or "hot breath" on gage, workpiece and master. Since body heat is transferred most rapidly through the fingers in contact with metal, he will frequently wear gloves or insulate the transfer by using wooden tongs.

Too few of us realize how fast metal picks up heat from the fingers or how long it takes for the metal to shed the temperature use. The chart in Figure 4 shows the number of thousandths a 24-inch caliper expanded when held in the two hands for five minutes and then set down to cool off—the latter taking fifteen minutes or more. The short, dotted line curve in Figure 4 shows the expansion of the same calipers—the comparative heat intake, in effect—when the calipers were handled with wool felt pads.

To be practical about it, the average measurement may suffer no innacuracy from ordinary quick handling. Many gages are provided, by design, with insulating handles and grips. But to cuddle a precision gage in your fist while you spend ten minutes talking to the new girl from the timekeeper's office and then turn to make a measurement is another story.

While temperature differences are important sources of precision measurement errors, vibration can also be an effective bedeviler. Vibration has the knack of sneaking in unobserved and robbing measurement of that final degree of accuracy so often needed. Vibration enough to unsettle a satisfactory measurement may not be noticed at all by those working in the immediate area even though they are alert to the possibilities.

If nothing else, a precision instrument should rest on rubber or cork pads. Also on a solid, heavy pedestal or bench which in turn could perhaps

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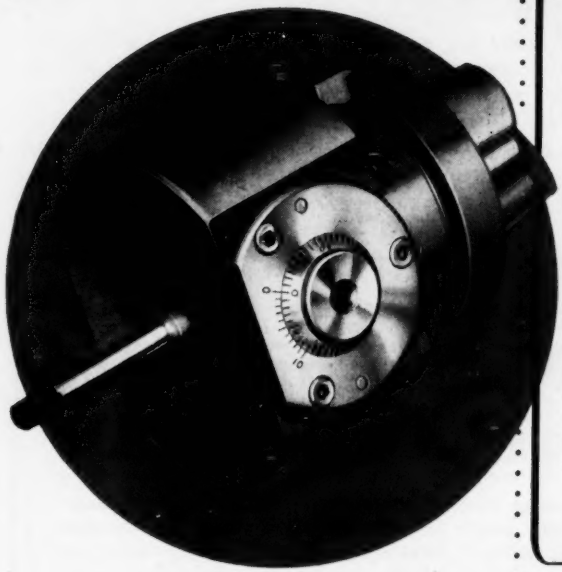

Illustration at right shows boring head with standard set of boring tools mounted in a fitted hardwood case.

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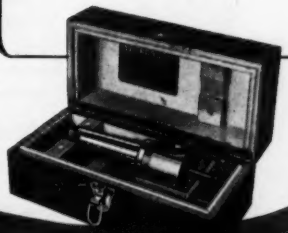

DeVLIEG of DETROIT

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be "insulated" by rubber or cork from the floor. Locating the extra precise gage over a floor beam (if it cannot be located close to earth on a ground or basement floor) may not be the best expedient. Master mechanics look for floor beams on which to set heavy, jarring machinery like air compressors and presses and, even though the thumper may be several bays away or even on another floor, its hammer blows are readily transmitted, directly channeled in fact, through steel girders and vertical columns.

But the $64 question is why, given a choice of placing a precision gage at the end of a bench next to an aisle or twenty feet away at the other end of the bench, do people persistently choose the aisle seat so the gage and its operator are within touching distance of fork trucks, rolling barrels or whatever sort of heavy freight constantly rumbles by?

All of which brings up also what might be called the psychological effect. It has often been well stated that the atmosphere of an inspection department, and a gage laboratory especially, should resemble that of a library for placidity. A man making measurements in millionths has got to concentrate and coordinate. If his fingers tremble, if he is jittery, he has the same effect on accurate results as any form of vibration or the nearby jolting of machinery.

Usually gaging equipment is shoved in anywhere expedient, especially after all the other machines, benches and operations have been conveniently, scientifically or efficiently located. The inspector often finds himself where every passerby will stop to pass

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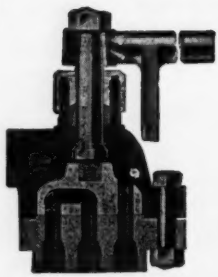

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the time of day, joggle his arm, or jab an elbow in his ribs. Often, he has no more chance for uninterrupted concentration than if he were behind the counter of the information booth at Grand Central Station.

And finally, dirt. Precision gages should be kept carefully covered when not in actual use. Too often they are not. Extra precise instruments should be used in a room or area that is as nearly dirt, grit and dust free as possible. Notice how often a sweeper will be kicking around the floor with a broom beside a precision gage setup just when an inspector is humped over a ticklish measurement chore. If not that, you will find someone has conveniently mounted a post type, utility grinder at about arm's length from the gage.

The anvil, the measuring contact, the master and the workpiece should be wiped carefully dirt free with a clean dry cloth—every few minutes if necessary. It takes only a microscopic bit of dust, grit, or fuzz to throw a measurement in millionths completely haywire. Chamois, paper towels and tissues are popular. Sometimes a film or coating of grease needs to be washed off the gage anvil or workpiece with alcohol or benzine.

Perhaps one of the most common habits is wiping an anvil or a piece clean with the palm of the hand. Too few of us realize that a mixture of sweat and dust, allowed a minute or so to dry, leaves a film on whatever the hand touches which has a texture not unlike cement—a film that may be just thick enough and firm enough to produce an unwitting error in measurement. Not that an inspector needs to

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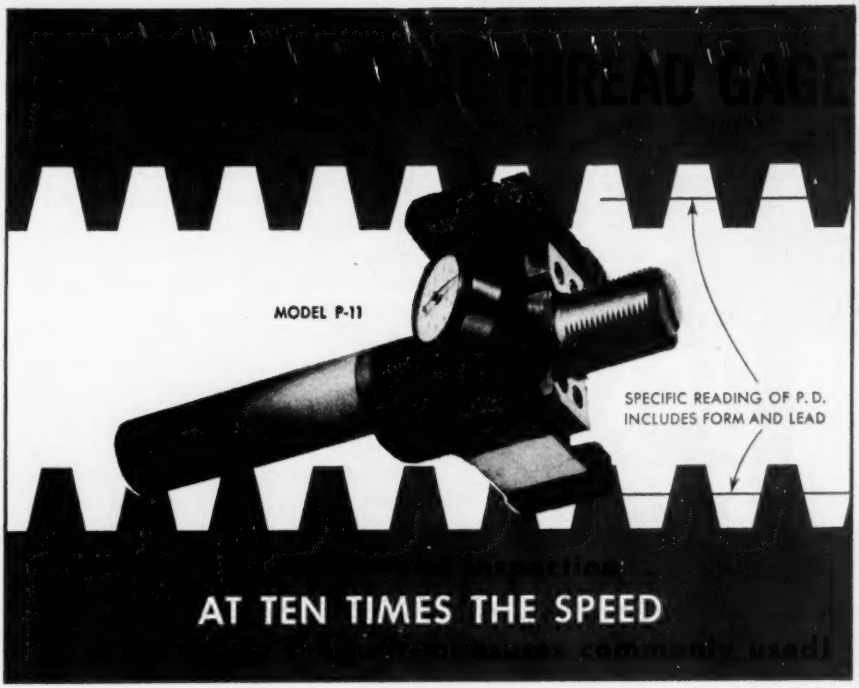

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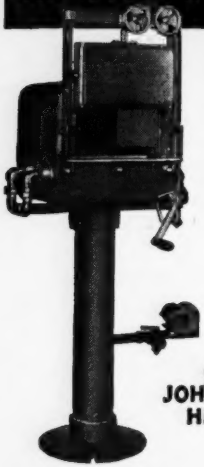

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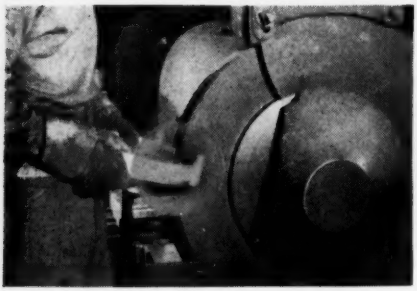
Then you'll grind off more metal per dollar, increase production and cut costs every day, on countless routine jobs.

And you'll realize that the *hidden profits* in your rough grinding operations need only this time-and-money-saving "Touch of Gold" to bring them to light.

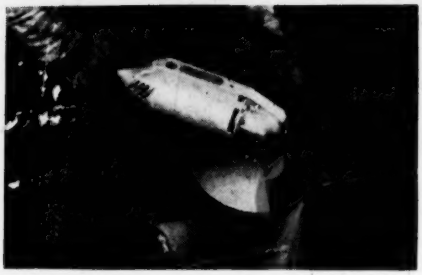
Your Norton Distributor can bring long, practical experience to your rough grinding problems. If necessary, he'll call in your Norton Abrasive Engineer for expert advice on new or difficult applications. Backed by the world's largest manufacturers of abrasives, with the broadest line to choose from, these Norton men will make sure you get exactly the wheels you need.

Ask your Norton Distributor for Booklet No. 1405 . . . 54 illustrated pages covering every phase of rough grinding. Or write direct to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — listed under "Grinding Wheels" in your telephone directory yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



On floor stands you grind faster and at lower cost with Norton ALUNDUM or CRYSTOLON wheels. There's a right Norton abrasive-and-bond combination for every metal, every job.

On portable grinders the smaller Norton wheels do the same big job of cost cutting. With their inbuilt balance they *hug that work* — to grind more metal per man-hour.



On many jobs the versatile Norton Nylon-Reinforced Hub Wheels — BD rigid and BFR semi-flexible — are the fastest, easiest, *safest* wheels to use. They're ideal for weld grinding and similar finishing operations.

On swing frame grinders Norton wheels stand up under heavy grinding pressures at high speeds, combining fast, clean cutting action with extra long wheel life. For high tensile strength metals use ALUNDUM* abrasive; for low tensile metals, CRYSTOLON* abrasive.

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ABRASIVES

Making better products...
to make other products better

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

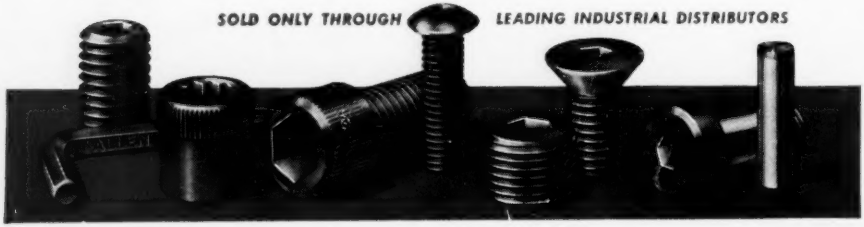
W-1498

Button head cap screws provide smooth streamlined surfaces which are desirable in many applications that do not permit countersinking. However, their sockets are necessarily shallower than those of standard socket cap screws.

This makes it doubly important to be certain you specify genuine *Allen ○ Button Heads*. The basic superiority of Pressur-Forming and Allenoy steel provide ample socket strength for satisfactory use, even with the shallower socket.

Sizes from #8 x ¼" through ⅝" x 2" standard with NC threads. These sizes also standard with NF threads except in ½" and ⅝" diameters.

SOLD ONLY THROUGH LEADING INDUSTRIAL DISTRIBUTORS



Important Meeting Dates

July 30-August 1

National Tool & Die Manufacturers Association Summer Meeting, Milwaukee, Wisconsin.

September 21-25

Eighth National Instrument Exhibit sponsored by the Instrument Society of America, Sherman Hotel, Chicago, Illinois.

October 19-23

National Metal Exposition sponsored by the American Society for Metals, Cleveland Public Auditorium, Cleveland, Ohio.

October 25-28

American Gear Manufacturers Association Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Illinois.

"Miss Dawson, there are certain dress standards we like to maintain even on the hottest days!"

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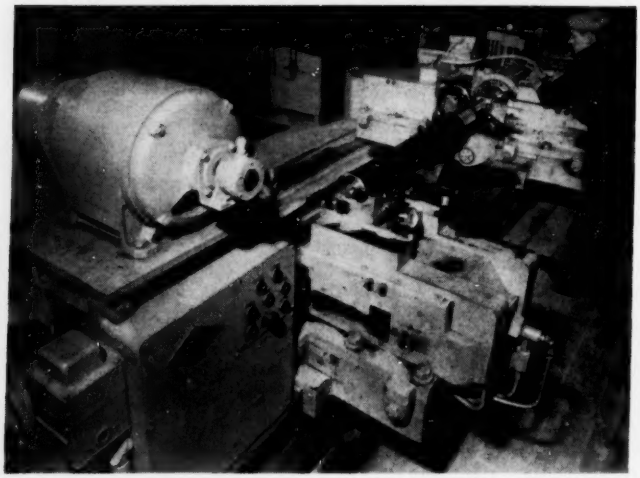
Automatic Machine Burnishing Used in Finishing Axle Journals

AUTOMATIC machine burnishing was adopted recently for finishing car wheel axle journals in the Glenwood shops of the Baltimore and Ohio Railroad in Pittsburgh. For this purpose, a heavy-duty end-drive hydraulically-operated burnishing lathe, developed by Baldwin - Lima - Hamilton Corp., Hamilton, Ohio, was installed.

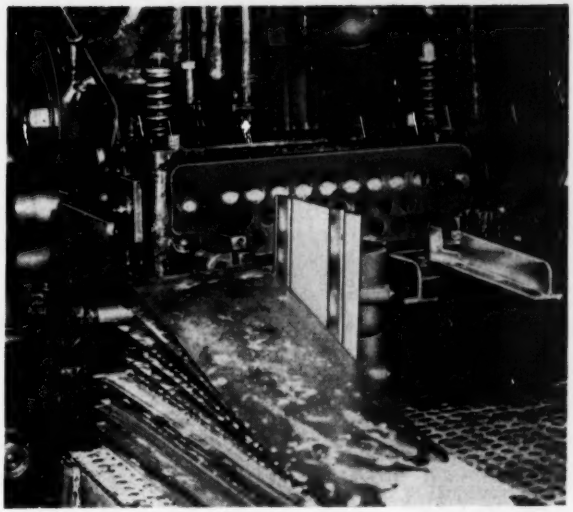
Burnishing, formerly a manual operation handled on axle turning lathes, is now performed as an almost completely mechanized operation. Predetermined pressure is applied hydraulically and automatically held constant on the burnishing wheels while the axle is motor driven at 220 r.p.m. and the selected feed speed is maintained between 1 and 20 inches per minute. Close controls during the burnishing operation result in a uniformity of finish that is believed to be an important factor in further reduction of the number of hot boxes experienced on the road.

According to company officials, use of the Niles burnishing lathe has re-



This automatic burnishing lathe, recently installed in the Glenwood shops of Baltimore and Ohio Railroad, is used for finishing car wheel axle journals.

This view shows how an automatic steel separator mounted on the roll feed to a press in the plant of the Electric Specialty Company causes the stack of steel sheets to automatically fan out at the end, permitting the operator to easily grasp the top sheet and feed it into the press.



duced burnishing time by 25 per cent. An operator can burnish both journals of an axle at the same time and finish up to 10 axles per hour. Average output for an 8-hour shift is 67 axles.

Manual labor is completely eliminated. Hydraulic devices under fingertip control position the axle in the machine, move the headstock driving plate and tailstock center against the ends of the axle with enough hydraulic pressure for the driving plate to turn the axle by means of frictional contact, and press each set of burnishing rolls against the axle at the desired pressure. Variable feed of roll carriages is also hydraulically operated and controlled. The machine accommodates axles 5½ to 9 feet long with journal diameters from 3¾ to 9⅞ inches.

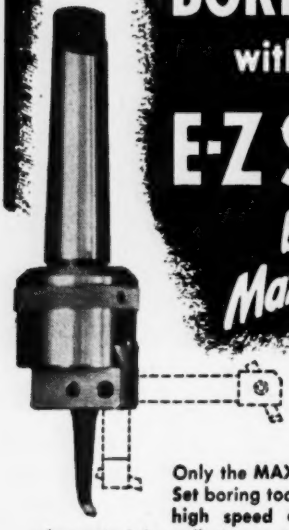
Automatic Separator Eliminates Danger of Feeding More Than One Steel Sheet into Press

COSTLY breakdowns caused by feeding a press more than one steel sheet at a time is no longer a problem at the Electric Specialty Co., Stamford, Connecticut.

One of the greatest bottlenecks in production for Electric Specialty was the slow, laborious job of an operator trying to pry apart steel sheets covered with grease and coolant substances. The sheets were slippery and extremely difficult to handle, even with special gloves. Using a Basco automatic steel separator on the roll feed to the press, the stack of steel sheets automatically fans out at the end, permitting the operator to easily grasp the top sheet and feed it into the press.

The separator comprises a permanent magnet that induces a magnetic field in the stacked steel sheets which tend to repel each other, causing the ends of the sheets to fan out with air space between them. No matter what substance appears on the steel or the amount of grease covering, the sheets, it is claimed, cannot stick together during feeding.

PRODUCTION BORING with E-Z SET by Maxwell



Only the MAXWELL E-Z Set boring tools feature high speed operation, micrometer-like adjustment to 0.0001-inch and maximum boring range.

Interchangeable shanks permit E-Z Set boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these Maxwell-made tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a boring range of from ⅜ to 20 inches.

Write today for catalog.

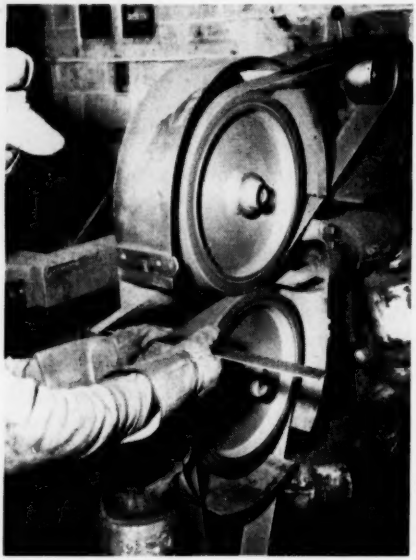
386-MC

THE MAXWELL COMPANY

325 Broadway • Bedford, Ohio

Rate of Grinding Flat Part Doubled by Using Two Abrasive Belts at Once

TWO coated abrasive belts, operating over vertically opposed contact wheels, doubled the production finishing rate of carpenter squares for one midwest manufacturer. This set-up permitted both sides of the flat metal product to be ground at once. Previously, the squares were offhand polished on abrasive coated set-up wheels.



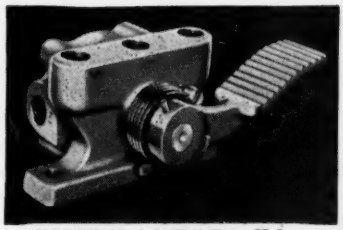
Both sides of flat metal part being ground in one operation. Square is passed through fixed gap between two coated abrasive belts. Contact wheels on shafts at fixed center distance balance the grinding pressure across the square. With the contact wheels turning in same direction, pull on the square is balanced.

The machine, as first set up by product engineers of Behr-Manning Corp., Troy, N. Y., consists of two coated abrasive belt grinders mounted in one

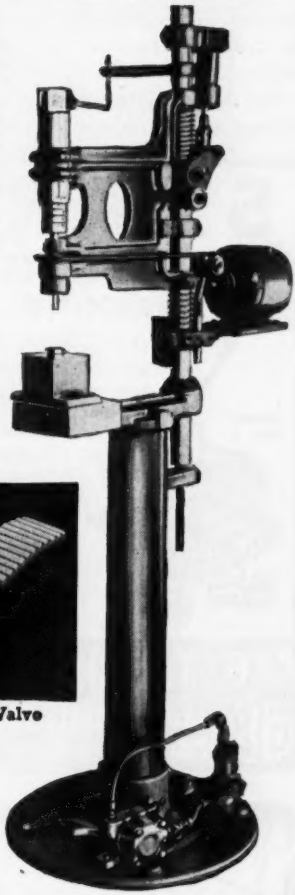
Airflex Pneumatic Riveters

Controlled by NOPAK Model "R" Foot Valve

A touch of the foot pedal on the NOPAK model R Foot Valve . . . which is coupled to a special timing valve . . . initiates an automatic riveting sequence on this and other models of the Airflex Riveter made by the Lemert Engineering Company, Plymouth, Ind. Operator fatigue is minimized and production is increased substantially by this successful application and precision control of air power.



NOPAK Model "R" Foot Valve



NOPAK 3- and 4-Way Foot Operating Valves are used in many ways on many different types of equipment for the precision control of air power applied to various machine movements. Ask your NOPAK representative to show you other examples in the NOPAK Application Manual.

GALLAND-HENNING NOPAK DIVISION
2758 S. 31st Street • Milwaukee 46, Wisconsin

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

Refer to Sweets File for Product Designers or write for Bulletin SW-1.

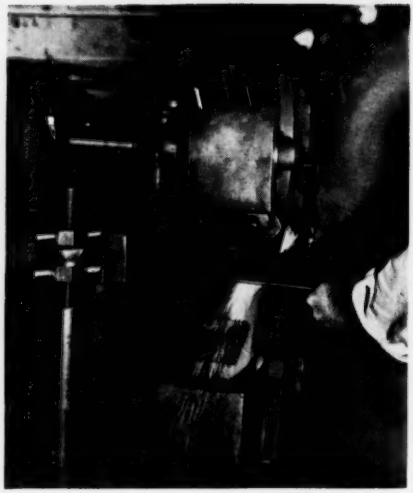
•

Representatives in Principal Cities.

A 7503-½I

frame and driven by one electric motor. The bottom belt operates vertically and the top belt operates horizontally. Rubber rimmed contact wheels support the belts where they contact the work and act as belt drive wheels. Two backstand idler pulleys—one in the frame base and one on the rear frame—maintain belt tension.

The center distance between the two contact wheels is fixed to maintain a gap between opposed abrasive belts equal to the final desired thickness of the square. However, the frame is adjustable to permit changes in center distance for grinding thicker or thinner stock. Since the same four V-belts from the motor drive both contact wheels, both contact wheels operate counter-clockwise (as viewed from the



Two threaded rods (in foreground) are the means for adjusting the center distance between contact wheels. By turning the nuts on the rods, the gap between belts can be changed to suit the thickness of finished work. Note the triple V-belt drive that turns both contact wheel shafts in the same direction.

SHARP

NAMEPLATE MARKING

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
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Tool and Die Makers acclaim it for utility, getting into nooks or crevices hard to reach with ordinary light—for lining up punches in dies or working with the scriber in close places. Completely adjustable and portable. Light does not reflect back to your face. Ideal for inspectors seeking burrs, flaws, etc.

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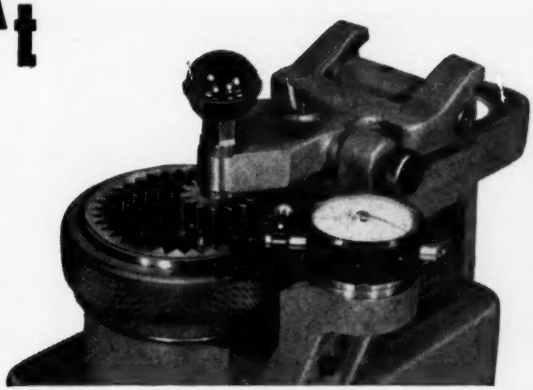
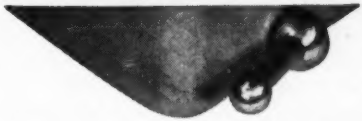
Box 429-M, Libertyville, Illinois

You don't have to FIGHT these Gear Rolling Fixtures!





Did you have difficulty mounting the gear due to the spring tension that caused your master gear to interfere when you tried to mount it? Did you have trouble getting the gear out of the fixture, especially a pot type fixture for internal gears? Was the slide action so stiff or so sloppy that you were never quite certain whether your checks were accurate or not? Was the fixture awkward to use? Did face runout on your internals make your roll check meaningless?

If you have had any of those experiences, you will "take off your hat" to the new line of Michigan Tool gear rolling fixtures. They were designed to eliminate every one of those problems that have plagued the rolling fixture operator in the past.

Ask for Bulletin 6-702 for complete specifications and information on the complete line of Michigan Tool Rolling Fixtures.

GEAR PRODUCTION HEADQUARTERS

MICHIGAN TOOL COMPANY DETROIT U.S.A.

COMPLETE from blank to finished gear EQUIPMENT

7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.

Inspector is shown operating equipment used by motor car manufacturer to simultaneously gage skirt diameter of automotive pistons at two places, taper from top to bottom, and cam grind on the skirt at three points.

right side) at the same speed. With wheels of equal diameter, the surface speeds of the belts are equal; however, at the contact points, the belts are moving in opposite directions. This arrangement balances the thrust or pull on the square being ground and permits the operator to retain full control of the work.

Gaging Automotive Pistons

FOR one of the world's largest manufacturers of motor cars, The Sheffield Corp., Dayton 1, Ohio, has manufactured a piston gage which provides for simultaneous gaging of piston skirt diameter at two places, of taper from top to bottom, and of the cam grind on the skirt at three points. In measuring the diameter, the Precisionaire also indicates in which one of eight classifications the piston belongs.

Referring to the accompanying illustration, the gage consists of a chrome-plated ring containing a number of air jets and two Sheffield "Plungets" connected to a five-column Precisionaire. Gaging is extremely simple and fast. The operator inserts the piston into the gage with the head up. Instantly, the position of the floats in the glass columns indicates whether or not the piston is dimensionally correct. Cam grind is checked at points 20 degrees and 90 degrees on each side of the major axis at the bottom of the skirt. Taper is measured between the upper and lower skirt diameters by comparison of two float positions.

ON OILY AND GREASY FLOORS
STOP
COSTLY SLIPPING ACCIDENTS
USE Tamms
FULLER'S EARTH
Adds greatly to the safety of your shop • Provides safe non-slip footing • Absorbs oil and grease • Lessens fire hazard because, unlike saw dust or wood shavings, it is non-inflammable • Every shop needs this low cost safety aid.
A trial will convince you. Send for FREE SAMPLE.
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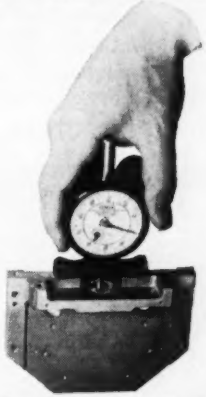
TAMMS INDUSTRIES, INC. 228 N. LA SALLE ST., CHICAGO 1, ILL

Why Fiddle Around with OLD-FASHIONED Depth Gages?

A MAN HAS TO DEVELOP A PRETTY KEEN SENSE OF TOUCH to use a flush pin gage with even reasonable accuracy. And such gages don't show any *trend* when the dimension is getting out-of-control until the operator is producing wrong depths. Micrometer depth gages are slow — they're not as fast, positive or accurate as Dial Indicator Depth Gages.

Federal offers several stock types of Depth Gages and will design and build other types to suit your particular requirements. Tell us what you need and we'll show you something to fit that need. Write, giving us the details. FEDERAL PRODUCTS CORPORATION, 1147 Eddy St., Providence 1, R. I.



A regular catalog type of portable depth gage which can be had with various lengths of contact points, either radius or pin-pointed, and either self-locating or push-down spindle. (Model 75P).

A bench type gage having a multitude of applications. Table and Indicator are pitched at a 15° angle for greater visibility. The Dial Indicator can be quickly adjusted vertically to suit depth of workpiece dimension (Model 75 B-1).

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES

Four-Way Machine Drills and Taps 55 Cylinder Blocks Per Hour

A transfer machine for drilling and tapping automotive engine cylinder blocks, developed by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 4, Mich., drills the oil holes running at compound angles from the camshaft main bearings to the oil gallery hole. The machine also drills and taps a hole in the pan rail on one side of the block.

As cylinder blocks approach the machine on a roller conveyor, they are transferred to a fixture that has been shuttled out and into convenient loading position. The block is located endways on the fixture from the pan rail and two locating holes. As the table shuttles back into drilling position, an air cylinder clamps against the top of the block to hold it securely against the fixture and stabilize it against drill pressure, which is at an angle upward against the block. Simultaneously, the locating pins also move up into the two locating holes.

Once the fixture and block are in position, the cycle start button is pushed to energize two of the drill head units on the machine. One unit drills an oil hole while the other unit drills and countersinks the hole to be tapped in the pan rail. When these units retract after drilling, the fixture

LEVIN®

MICRO-DRILL PRESS

for holes as small as .002"

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted 1/8" capacity drill chuck can also be used.

Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.

Introducing...

RODDICK ***self-releasing***

TAP HOLDER

with

BALL-ACTION CLUTCH

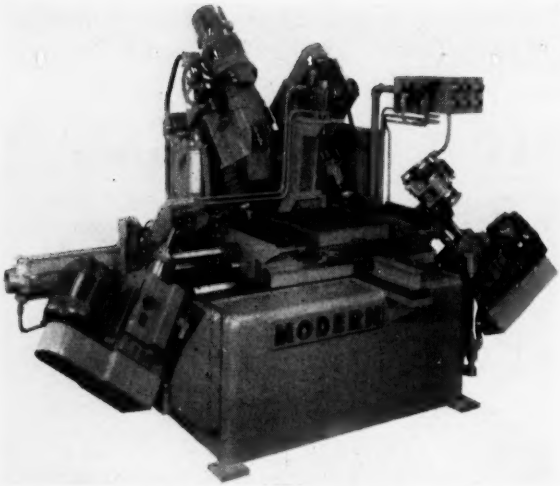
Assures:

- **Accuracy**
- **Safety**
- **Minimum wear**
- **No hammering of clutch**

Taps can be changed in a few seconds, in two operations—no bushings required
Right or left hand tapping
Can be used on rotating or non-rotating positions
Floats tap into hole
3/32" length of pull-out to release
Uniform depth of thread regardless of feed
Solid shanks for strength
Floating back jaws compensate for off-center tap squares
Threading operation can stop and start at any point without difficulty or shock

Send for leaflet giving more detailed information about this incomparable tool which incorporates a revolutionary principle that will speed production and produce better work.

8776 GRINNELL AVE. **EMPIRE TOOL COMPANY** **DETROIT 13, MICHIGAN**



Three holes are drilled at compound angles and one tapped in this four-way machine designed for the production of automotive engine cylinder blocks.

is automatically shuttled to the left and locked in position for the next operation. The other drill head and tapping head then automatically begin drilling the other oil hole and tapping the hole in the pan rail simultaneously. As soon as these holes are finished, the drill head and tapping head retract and the fixture and cylinder block shuttle back to loading position, with the air clamp being released and the locating pins stripped from the block at the same time. The block is then automatically transferred back onto the roller conveyor and another block loaded into the fixture and the cycle repeated.

Operating at an efficiency of 80 per cent, the machine is said to handle 55 cylinder blocks per hour.

Carburizing Small Parts in Rotary Retort Furnaces

A LARGE midwestern automotive manufacturer is successfully carburizing small parts on a mass production basis in Surface Combustion rotary retort carburizers of the type shown in Fig. 1. The carburizer, oil

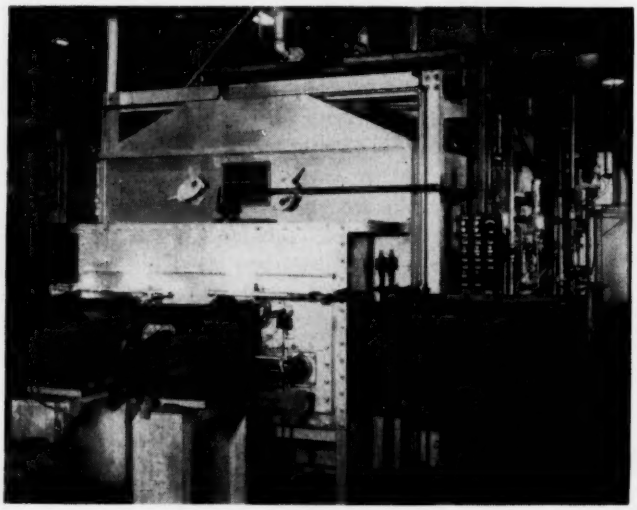


Fig. 1—Charge end of rotary retort furnaces with vibratory feeders

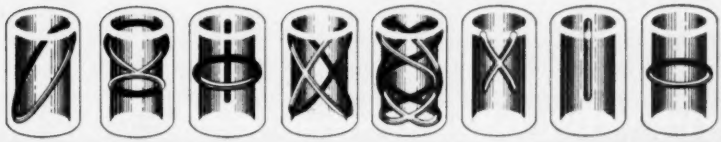
You can make JOHNSON GP BEARINGS fit 90% of your needs

OTHER BEARING TYPES
Electric Motor • Graphited • Self-Lubricating Powder Metallurgy • Universal Bronze Bars • Babbitt Metal.

These standard stock size cast bronze sleeve bearings can be altered easily, oil grooves and holes added to suit most applications. There are over 900 sizes available, in sizes from ¼ inch to 4½ inch ID, a wide range of wall thicknesses and lengths. They are completely machined, ID, OD and ends, to standard tolerances. Since they are produced in long factory runs they are extremely low in cost, all pattern and set-up charges having been absorbed. Make use of them —save yourself time and machining costs. Johnson GP (General Purpose) Bearings are sold by your local Johnson distributor. Write for catalog today.

JOHNSON BRONZE COMPANY
590 South Mill Street, New Castle, Pa.

JOHNSON JB BEARINGS
Sleeve Type



TYPES OF OIL GROOVING

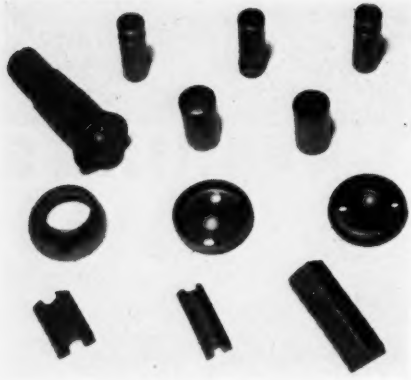


Fig. 2—Typical parts carburized in rotary retort furnaces shown in Fig. 1

quench, washer, and draw furnace are interconnected by screw conveyors. These conveyors, enclosed in rotary retorts within the carburizer and draw furnaces, extend into the enclosed quench and through the washer. All movements are completely automatic and integrated. The carburizer is equipped with gas-fired radiant tubes and utilizes enriched RX prepared atmosphere gas. Production rates average 368 lb. per hour net.

Continuous operation has provided consistently satisfactory results on such parts as shown in Fig. 2. At the same time, the user has experienced considerable reductions in gas consumption, elimination of much handling, and minimum of maintenance.

Toggle-Clamp Equipped Holding Fixture Increases Air Dust Production Over 50 Per Cent

UNITED Stove Co., Ypsilanti, Mich., subsidiary of Gar Wood Indus-

Be SURE of the Job... with *ROOFE* Live Centers

• Users everywhere report increased production . . . lower costs . . . longer life . . . maximum accuracy with ROOFE Live Centers on the job.

Illustrated: ROOFE Standard Type Live Center available in Morse Taper, Brown & Sharpe, Jarno, Straight or Special shanks to your specifications.

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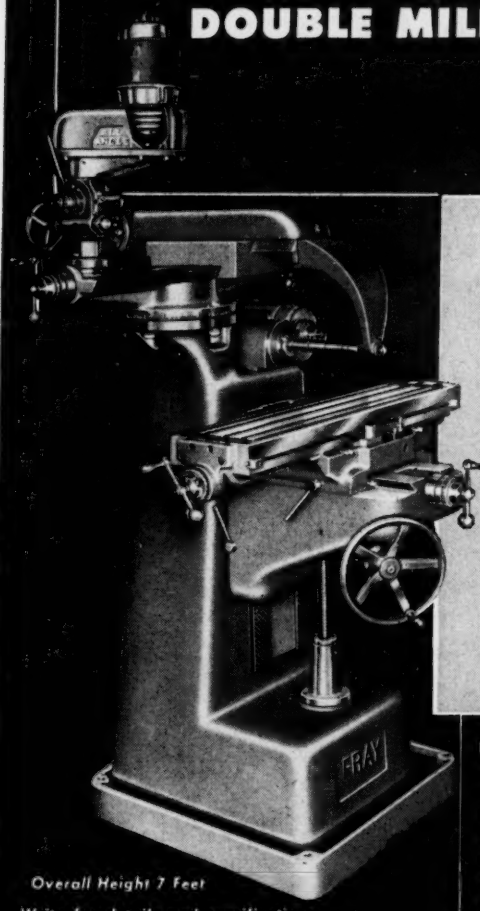
HOUSTON GRINDING & MFG., CO., Inc.

2110 QUITMAN STREET • HOUSTON 10, TEXAS

Reliable Distributors Wanted

FRAY TOP SLIDES
DOUBLE MILLING RANGE



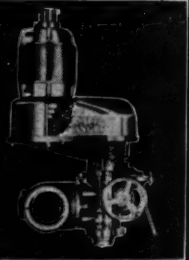
Overall Height 7 Feet

Write for details and specifications . . . Request Bulletin # 10

A Fray pays bigger production dividends by performing an unequalled range of milling operations. Both of the top slides on the Fray 10 RH are easily adjustable. This feature permits alignment of the turret slide with the table, *thus doubling longitudinal and cross milling range* . . . or you can just as simply set the turret at an angle to the table and mill in two directions. Combined, the turret slide and table slide provide 38" of overall travel, while the table cross slide, plus the ram slide permits a full 18" of in-and-out adjustment. This equals the overall range of much larger machines. Fray moves precision work faster at less cost.

Fray "All-Angle" Head TYPE 4

For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.



all-Angle

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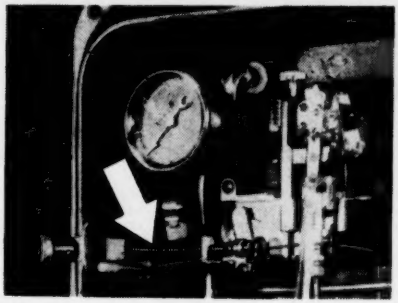
MIDDLETOWN, N. Y., U.S.A.
Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines.

tries, has increased the production of air ducts for automatic washer-driers over 50 per cent by redesigning the duct-holding fixture to include De-Sta-Co toggle clamps made by the Detroit Stamping Co., 349 Midland Ave., Detroit 3, Michigan.

The original fixture frame weighed 65 lb. and two men handled the unit while the air-duct assembly was being spot welded. According to J. H. Allie, chief tool engineer, United Stove Company, the present fixture weighs but 22 lb. and requires only one man for the spot-welding operation. Production has risen from 39 pieces per hour to 67 pieces per hour by replacing the clamps originally used with toggle clamps and redesigning the frame member of the fixture. The positive locating and firm holding pressure provided by the toggle clamps, plus the weight reduction of the fixture, allow for speedier production of the air-duct

Toggle-clamp equipped fixture used at United Stove Company in holding air-duct assembly firmly in position for spot welding

Little stories of BIG SAVINGS with S.S.WHITE FLEXIBLE SHAFTS

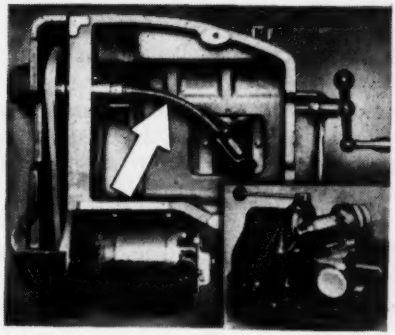


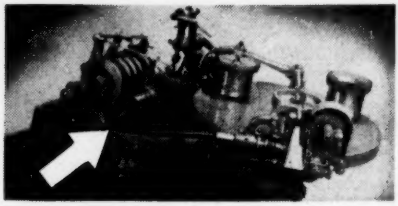
REMOTE CONTROL

By using a short length of flexible shaft to couple an interior operating mechanism to its control knob, the manufacturer of this device eliminated alignment problems and reduced assembly time and costs.

POWER DRIVE

An S.S.White flexible shaft drive for the valve holder of this valve grinding machine enables the valve holder to be set in different operating positions. The simplicity of the arrangement means fewer parts, easier assembly, reduced production time and costs.





POWER DRIVE

By using an S.S.White flexible shaft to bring power around a turn from one part of the unit to another, the manufacturer of this machine eliminated a lot of unnecessary parts which would require extra handling and care in assembly.

GET THE AMAZING FLEXIBLE SHAFT STORY

The 256-page flexible shaft handbook has full details on flexible shaft selection and application. A free copy will be sent if you write for it direct on your business letterhead.

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DENTAL MFG. CO.

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NEW YORK 16, N. Y.

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units which, in turn, affords greater flexibility in manufacturing schedules on other standard and semi-special processes of the company.

Electronic Gaging Equipment Used in Manufacture of Roller Bearings

FINISH-GROUND rollers for Timken "Double Zero" roller bearings are checked by the grinding machine operators for diameter, taper, and out-of-round within 0.000020 inch using reciprocating gaging fixtures like the one shown in Fig. 1. The gaging fixtures were designed and built by Timken, and the measuring element for each fixture consists of a Cleveland Instrument Company Par-Ac electronic gage head and amplifier.

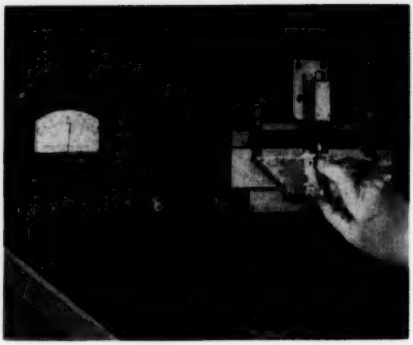


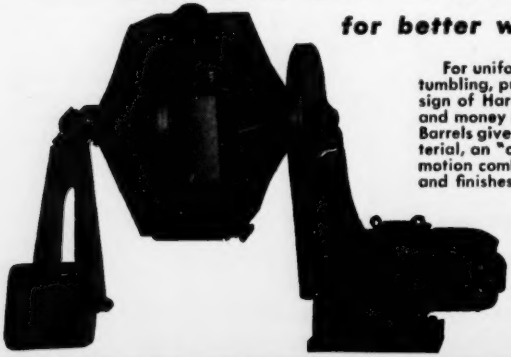
Fig. 1 — A reciprocating gaging fixture is shown being used to check finish-ground bearing roller for diameter, taper, and out-of-round within 0.000020 inch.

The roller is placed in the fixture which slowly moves it back and forth beneath the gage head. The anvil of the fixture is at the same angle as the required taper of the roller, so that

HARTFORD *TRIPLE ACTION*

CUTTING *and* TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

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2H552

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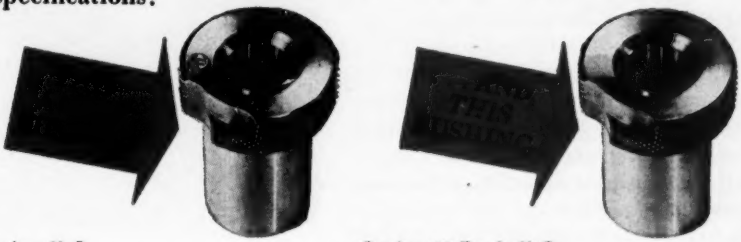

- Is 62 Rockwell C
- Contains metallic carbide formations for at least 18.5% extra wear resistance
- Has full carbon content of .90%—1.10% right out to working surface
- Is concentric to .0003", full indicator reading
- I. D. and O. D. conform fully to A•S•A standards

- Is also 62 Rockell C
- Has no metallic carbide formations for extra wear
- Surface is decarburized to .70% carbon, still giving full hardness but causing some loss in wear resistance
- Run out of bore to O. D. is .0008", full indicator reading
- O. D. is .0001" *under* and I. D. is .0001" *over* the A•S•A standard

Every A•B•C Bushing is made of chromium or chromium tungsten oil hardening tool steel having 18.5% greater wear resistance.* Every A•B•C Bushing is heat treated in one continuous automatic, electronically controlled operation, in which every step, including quenching, is under a protective blanket of neutral atmosphere. This extra A•B•C precaution insures this higher wear resistance right out to the working surface. That is why

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when the taper is perfect, there is no movement of the gage head as the roller passes beneath it. This equipment checks the rollers simultaneously for taper and size. In addition, the operator gives the roller two or three partial turns while gaging so that any out-of-roundness will be disclosed. Deviations from nominal are shown by the meter on the nearby amplifier (0.000010 inch per scale division). Similar equipment is used for 100 per cent final inspection of the rollers, as above, and for sorting the rollers by diameter in increments of 0.000020 inch.

Figure 2 shows a shop inspection setup for checking the geometry of finish-ground inner and outer races of Timken "Double Zero" roller bearings within 0.000025 inch. With the magnetic chuck rotating at a partial holding power, the part is centered by bringing the tip of the Cleveland Indi-Ac electronic indicator head in contact with the o.d. and tapping the side of the work until it rotates within 0.000020-inch runout, as shown by the meter on the amplifier. The Indi-Ac is then used as illustrated to check the parallelism of the face of the rear shoulder with respect to the end face. With the same work setup, the Indi-Ac is used for checking the parallelism of other faces, the squareness of the taper, and concentricity of the i.d.—all within 25 millionths.

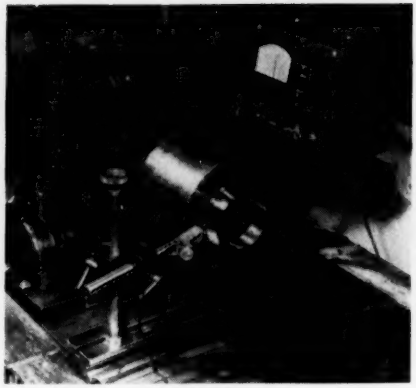
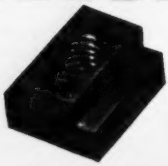


Fig. 2—This illustration shows a shop inspection setup for checking the geometry of finish-ground inner and outer races of roller bearings within 0.000025 inch.



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STRAP CLAMPS

SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.

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PATENTED CUTTING OFF TOOL HOLDERS

PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured by

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A PREDICTION
on the shop of the future

No head colds—No dermatitis—No offensive odors—
Clean floors—Clean hands and clothing—Fresh air

Working conditions in the shop of the future will be as attractive as your office. Labor will have little cause for complaint. Production will move smoother and faster. Good housekeeping will help hurry along that happy day—good housekeeping furthered by the use of Lusol in your machine tools.

REDUCE ABSENTEEISM . . . Lusol won't irritate workers' skin; it's as safe as soap. Lusol doesn't smoke, even under extreme pressure on high-speed cutting operations; there's less likelihood of head colds and the general atmosphere is brighter. There's nothing about Lusol, in a machine that's kept clean, to cause disagreeable odors.

BOOST EFFICIENCY . . . Workers like the neatness of shops where Lusol is employed. Machines kept clean and served by this all-chemical metal-working solution don't gum up; Lusol actually removes old sludge. Floors stay cleaner; Lusol isn't oily, so you don't have the expense of non-slip compounds. Wives of workers newly introduced to Lusol have been known to say, "You must have a new job; your clothes stay so clean now."

SPEED PRODUCTION . . . Lusol's more rapid cooling permits much higher speed machining. The less frequent tool grinding and fewer grinding wheel dressings required, the elimination of degreasing operations, all contribute to faster output by men and machines. Your costs are lower because production is higher.

FREE BOOK . . . gives case histories supporting the above statements. It also tells you how to clean machines and put Lusol to work in them. For a copy, write F. E. Anderson Oil Company, Inc., Box 216-J, Portland, Connecticut.

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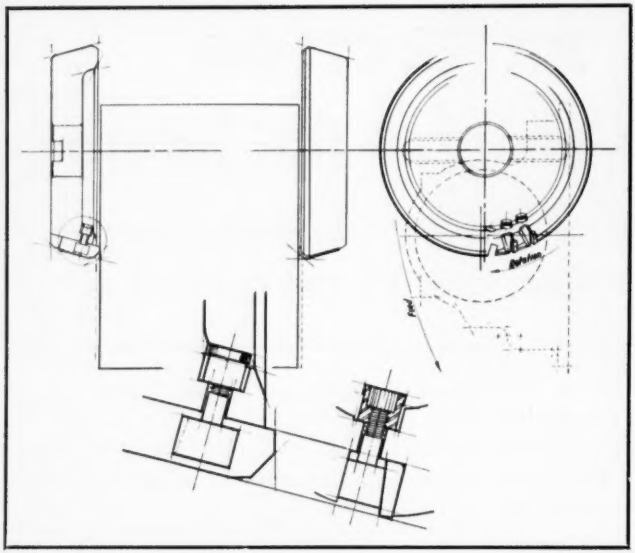

Straddle milling cast iron gear cases with Style "MF" Face Kennamill. Operation is performed on Davis Thompson drum-type mill using four cutters — two roughing and two finishing. Drawing shows how blades are held in cutter. Wedge-screw is one-piece hardened alloy steel, pulled tight with Allenut. There are no threads in cutter body.

Straddle Milling Transmission Gear Cases

THE straddle milling of 3,500 cast iron automatic transmission gear cases per tool grind is being accomplished on a 20 h.p. Davis Thompson drum-type mill using two units for rough milling and two for finish milling. These four 12-inch diameter cutters are "MF" axial face Kennamills produced by Kennametal Inc., Latrobe, Pa. Each cutter has 36 solid blades of Kennametal Grade K6 and is operated at 26 inches per minute feed rate, 0.009-inch feed per tooth, and 250 surface feet per minute at 80 r.p.m. The average depth of cut for the roughing cutters is $\frac{3}{16}$ inch on each side. For the finish cut, about 1/32 inch of stock is removed per cutter.

Under similar operating conditions, 3,000 to 3,500 pieces may be straddle milled before cutters require any regrinding. Reconditioning time per cutter is only one hour. Resharpening consists of diamond finishing both corner and face angles on the solid tungsten carbide blades.

• ACCURATE
• INCREASES PRODUCTION

Minimum overhang gives more rigidity and more machine capacity. Spring loading allows for work expansion from heat while machining.

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2 M.T. $23.93
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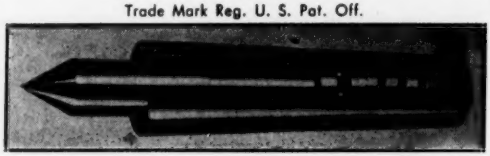

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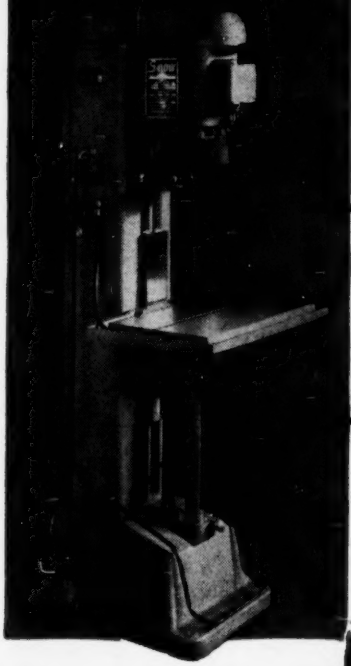
SNOW

FULL UNIVERSAL MACHINES

For Top Production

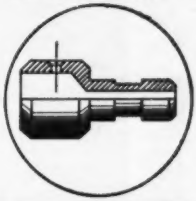


Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Crossdrill and C"T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



TAPPING

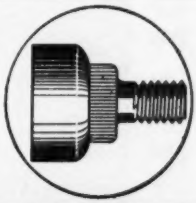
Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING

3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

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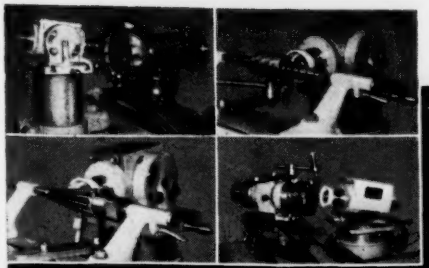

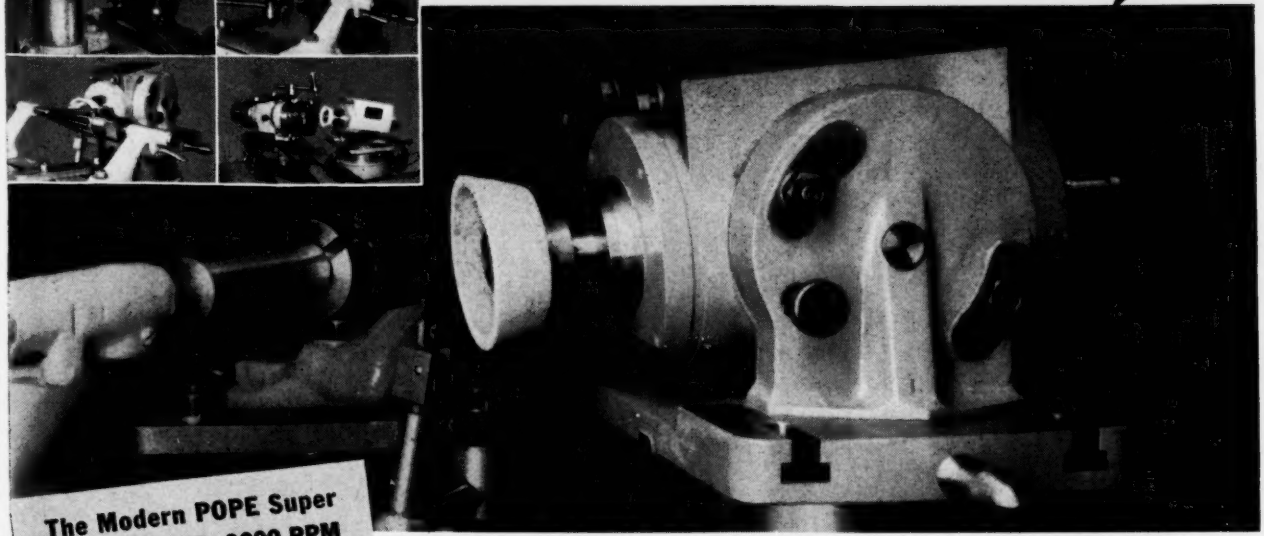

The Modern POPE Super Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Head With Angular Adjustment In A Vertical Plane

This new unit is super-precision throughout . . . It is designed particularly for replacement of tool grinder heads which do not have the extremely useful angular adjustment in a vertical plane.

It will more than pay for itself — reduces set-up time — makes wheels cut faster — spark out quicker — produces the kind of cutting edge on your tools that stands up and cuts longer.

Pope Motorized Grinder Heads are available for most makes of cutter and tool grinders. Ask for quotation to cover your grinder.

No. 92

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To Protect Their Ships From Unseen Dangers . . .

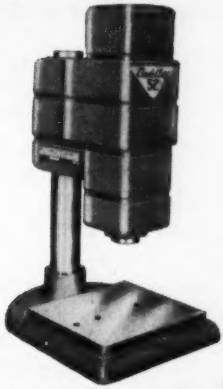
Mariners Use Marking Devices

Guiding his ship through shoal, narrow or treacherous waters, the Mariner depends on channel buoys, lighthouses, flashing lights, and other marking devices—all directing him to his safe course through navigable water.

CADILLAC 52

Air Impact Press For High Speed Marking—

Assembling, Branding, Staking, Crimping, Riveting and also for producing Light Stampings



This new Cadillac "52" is faster, has more power, more pressure. It delivers in speeds up to 10,000 strokes per hour — pressure can be obtained up to 8 tons, and is adjustable from light to heavy marking. The pressure can also be regulated to give proper ram action for branding or color leaf marking. Special jigs or fixtures are not required for average work. The Cadillac "52" has automatic controls which "think" for the operator — give high production. Can be supplied as: Hand actuated, foot actuated, electrically actuated. It is light in weight, can be easily moved.

For full information write for Bulletin A-52

DIE INSERTS

ROLL SEGMENT DIES

FORGING HAND STAMPS

Many marking problems can be solved by Cadillac Marking Devices such as these . . . all made of special alloy tool steel, giving long life and unexcelled performance.

For full information write for Bulletin SE-130

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ideas from readers

Air Thrust Bearing

By Ira S. Roberts

A NOVEL use of compressed air—as a substitute for a conventional thrust bearing between a heavy rotating plate and a fixed base plate of a machine tool — has been worked out by tool designers at Solar Aircraft Co., San Diego, Calif. The resulting application of the "air thrust bearing" on a Natco multiple spindle drill unit has proved useful and economical, with several advantages over ordinary methods of doing the same job.

Figure 1 shows how the air thrust bearing is employed on the index table for a drill jig. The copper manifold tube is connected to a manually-operated air valve that controls the air supply. The table tees located radially around the plates lead the air into the space between the moving plate and the fixed plate. Location of the tees is determined approximately as indicated in the sketch in Fig. 2.

The operation of the bearing is as follows: Air at 90 p.s.i. is introduced to the

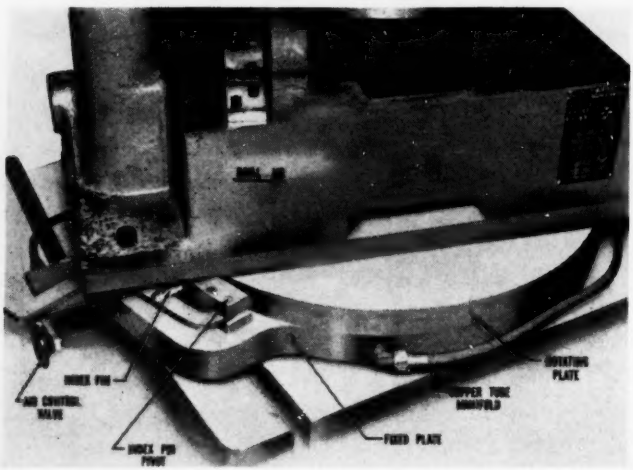
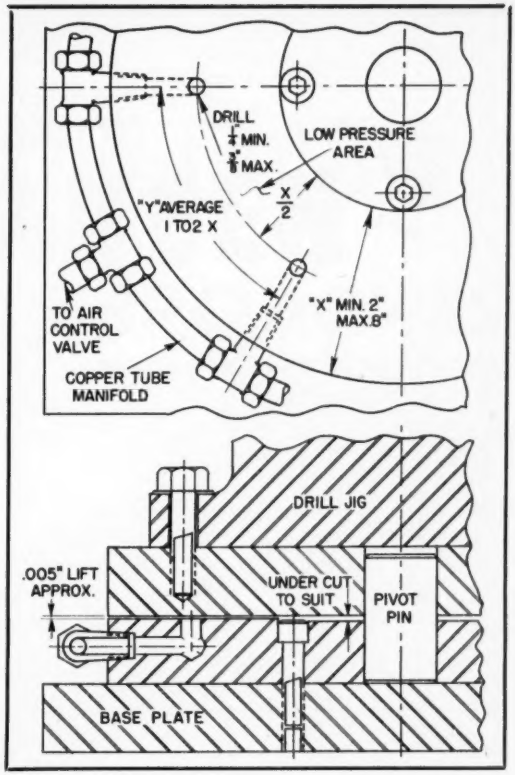


Fig. 1—This illustration shows an application at Solar Aircraft Co., San Diego, Calif., of the "air thrust bearing" on a drill jig that weighs approximately 200 lb. The drilling operation is performed on a Natco drilling machine by a woman operator who has no difficulty in indexing the fixture.

Fig. 2—The location of the tube tees is determined approximately as indicated in this sketch.



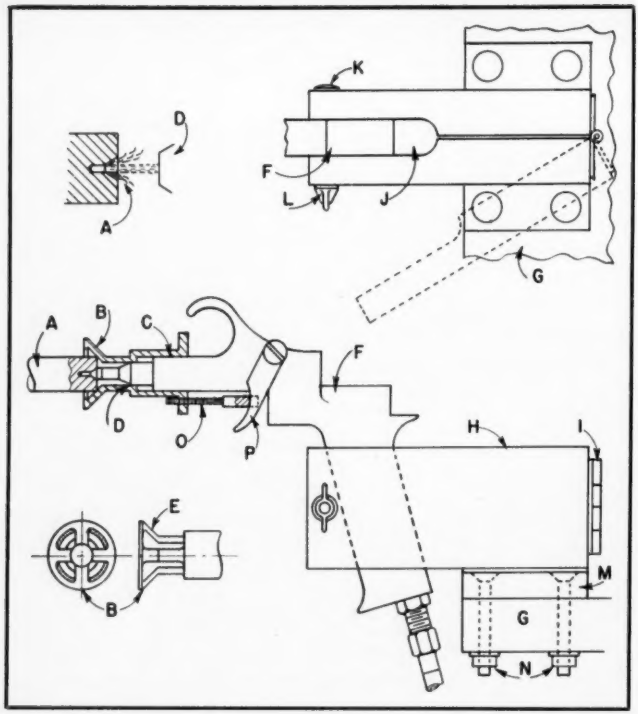
manifold by opening the air valve. This causes the rotating plate to be raised approximately 0.005 inch. The rotating plate is then moved to the next index point and the air valve is closed. The air in the system escapes and the rotating plate settles down on the base plate, providing a solid support for the drilling operation.

At first glance it may be difficult to see how this type of air bearing is able to lift a heavy load, since it appears that the total lifting force is the product of the air pressure and the area of the ¼-inch diameter holes. This would be correct if the plates were lapped for a perfect fit. In most plate applications on tools of this type, however, the plates are machined and have minute grooves through which air can travel, and the air after entering through the holes travels around the contact area of the plates. This provides an effective lifting area equal to the base plate area of the face. Since the differential between the air entering at 90 p.s.i. and the air escaping is approximately 45 p.s.i., an effective pressure of 45 p.s.i. is provided on the area between the plates. This pressure times the contact area of the plates is the actual lifting capacity of this type of bearing. An important precautionary measure in using air bearings is that the contact area of the plates must be protected against chips. This can be done by providing felt wipers to seal the joint formed by the plates.

Blowing Out Centers Ensures Accuracy in Grinding

By F. E. Riley
England

CLEAN center holes are essential for accurate work on grinders; however, methods of cleaning such holes before mounting the work on the machine are often inadequate. In some



Sketch of air gun set-up for effectively blowing out center holes of workpieces

cases, the operator uses a piece of rag in attempting to remove any particles of foreign matter which may be present in center holes.

In centering work handled in our shop, we always took the precaution of lapping out the center holes; however, it was discovered that we were not obtaining work that was absolutely circular or concentric. Investigation revealed that what appeared to be a perfectly clean hole was, in reality, contaminated with small particles of dirt which had been picked up by the center during the passage of the work from one operation to another. The operators tried to keep the center holes as clean as possible, but the rag method used for this purpose was not sufficient. Therefore, we decided to try to improve the center hole cleaning method.

Experiments revealed that a blast

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Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.
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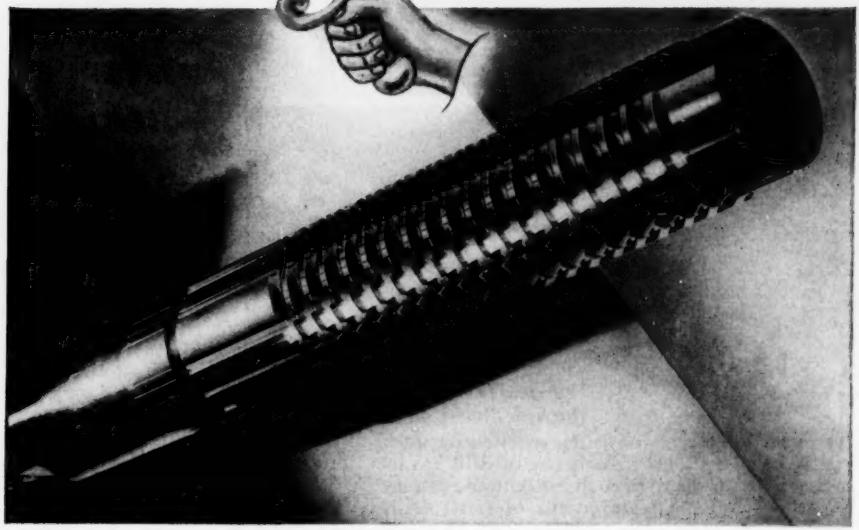

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BETTER QUALITY WORK

The real extent of the manufacturing economies a fine broach makes possible is still a field of rich surprises . . . especially when you mount a Connecticut Durakeen Broach on any of your machines.

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THE CONNECTICUT BROACH AND MACHINE COMPANY
NEW LONDON, CONNECTICUT

ICB53A

from a standard air gun of the small type for hand holding would clean out a center hole very thoroughly, but in order to assure the success of this method, it was necessary that the jets from the gun nozzle be accurately located in line with the center hole to be cleaned so that the stream of air bounced in the hole bottom and reversed its direction, carrying with it any particles of dirt present in the hole. The view in the upper left-hand corner of the accompanying sketch illustrates the action of the air blast upon the interior of the center hole. A means for centering the hole in the workpiece, **A**, with the air blast was provided in the form of a conical mouthed sleeve, **B**, which was arranged to slide easily on the outside surface of the air gun barrel, **C**, and nozzle, **D**. The conical interior surface of the sleeve was made sufficiently large to accommodate a wide range of workpiece diameters. The cone wall was cut away so that only four narrow ribs, **E**, supported the end of the workpiece, the spaces between the ribs being sufficiently large to allow the air coming from the work center hole to escape freely.

In order to make the center-blowing operation a one-handed task, the gun, **F**, was mounted on a bench, **G**, located adjacent to the grinding machine. The mounting for the gun comprised a pair of wooden clamping members, **H**, hinged together

Eliminates Rummaging Through Stacks of Drills

No more running out of drills—your entire stock can be seen at a glance. Each size of drill has its own compartment with rounded bottom for easy selection. You can store dozens of small drills and several large ones in their own compartments. Built-in pricing or inventory system eliminates the need for cost sheets, and will keep a record of drills on hand. Stack two or three cabinets to save space. Specifications: 14½" long, 7¼" high, 7¼" deep. Hammerlin baked enamel finish over rugged steel. *Write for bulletin.*

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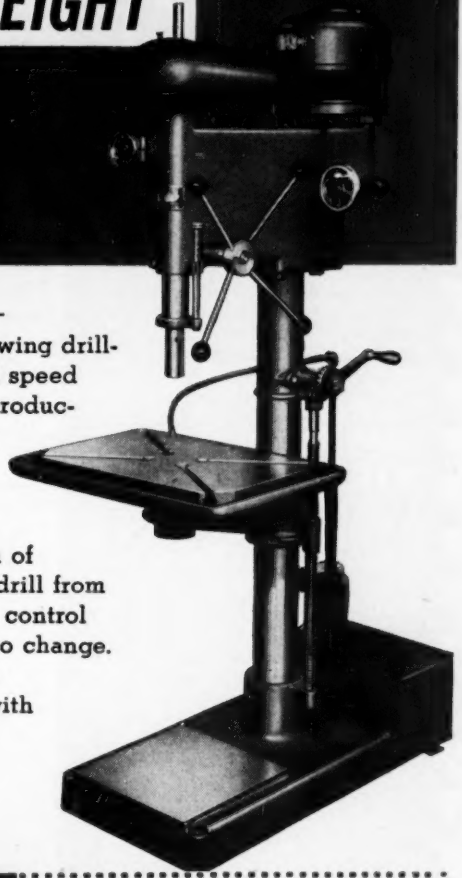

Not too light, not too heavy—weighing 765 lbs., this 25" swing drilling machine has the required speed and power for high volume production. Accuracy of large table with coolant trough is maintained to .0007" in six inch radius. The variable speed drive permits selection of the exact speed for any size drill from 1/8" to 1". Convenient speed control is self-locking with no belts to change. Tachometer permits accurate reading of speeds. Powered with a 1-1/2 H.P. Axial Air Gap Motor. 5 spindle speed options.

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as shown at **I** and with recesses cut in the middle faces to conform to the shape of the gun handle, as indicated at **J**. The gun handle was locked between the clamping members by means of a bolt, **K**, and wing nut, **L**. One-half of each wooden clamping member was fastened to a baseboard, **M**, which, in turn, was secured to the bench top by means of the bolts, **N**. Thus, if the gun was required for purposes other than center blowing, it could be unclamped quickly.

In use, the operator inserts the end of the workpiece, **A**, into the mouth of the centralizing sleeve, **B**, and pushes gently in an axial direction. This action causes the sleeve to slide along the gun barrel, **C**, so that an adjustable trigger rod, **O**, actuates the gun trigger, **P**, and initiates the air blast. The trigger rod is made adjustable so that the distance between the mouth of the work center hole and the nozzle can be set for the best possible effect. It will be apparent that a large diameter workpiece pushed into the centralizing cone will be further away from the nozzle than will a small diameter piece when the air blast is turned on.

Cloth Sack Aids Diamond Salvage

By B. G. LAWRENCE

AT the Edmore, Michigan, plant of the Carboloy Department of General Electric Company, an ordinary cloth sugar bag is the main "component" of a simple method of salvaging diamonds from grinding sludge, recapturing enough diamonds in a month to have them made into four or five additional grinding wheels at a nominal

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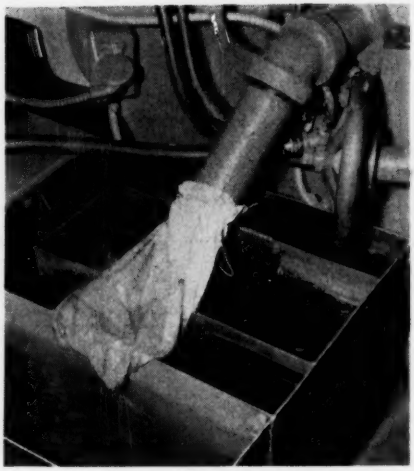
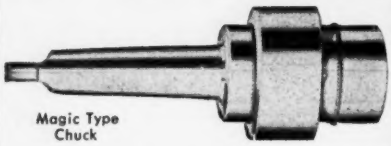
cost. The bag acts like a coffee strainer. It is tied to the exhaust end of the coolant pipe leading from the machines which grind cemented carbide tools with diamond grinding wheels. When other types of grinding wheels are used on the same machines, the bag is removed to allow the coolant and non-diamond sludge to go into the regular coolant reclamation system.

According to K. R. Beardslee, Carboloy's general manager, the "bag system" still enables the coolant to flow into the reclamation system. However, instead of making it necessary to clean out all of the sludge from the tanks and processing it for the diamond particles, the bag saves only the sludge coming from the diamond grinding wheels.



A cloth sack is tied around the pipe which bleeds off both coolant and sludge from a grinder at the Edmore, Michigan plant of the Carboloy Department of General Electric Company. The cloth bag is used only when diamond wheels are in operation. This process saves thousands of dollars in reclaimed diamonds by concentrating the valuable diamond sludge and making the reclaiming process considerably more economical.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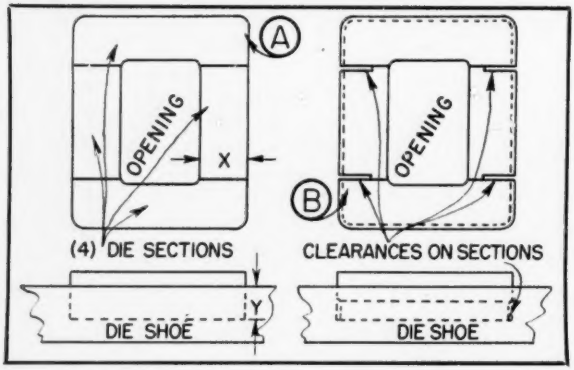


Sketch showing two methods of machining die sections to be fitted into a cavity in the die shoe

Die Block Clearances Effect Fitting Ease

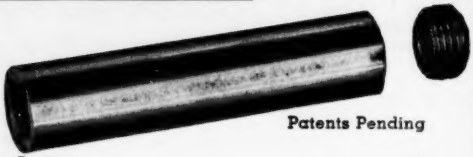
By F. C. Elmo

THE accompanying sketch shows two methods of machining die blocks that are to be fitted into a cavity in the die shoe. Many toolmakers use the method shown at **A**, which entails fitting each die section along its entire width, indicated as **X**, and also along practically its entire thickness, as indicated at **Y**.

A simpler method of fitting die sections is shown at **B**, in which clearances are provided on the die sections as indicated. With this method, grinding is also held to a minimum since the mating die block surfaces are appreciably reduced.

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.
The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



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SLEEVES MADE IN FOLLOWING SIZES:
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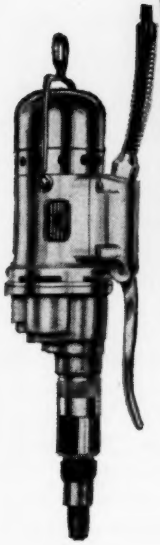
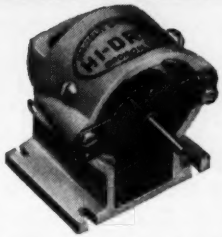


OUTPUT JUMPS 110%

with Millers Falls "Adjustomatic"® Clutch Electric Screw Drivers



"Hi-Drive" — big name in midget motors — manufactured by Blake Manufacturing Division, Ray-O-Vac Company.

Driving tiny, self-tapping screws in a thin plastic housing — it's the kind of job usually considered too delicate for power drivers.

Yet, Millers Falls No. 52's with the *patented* "Adjustomatic" Clutch are performing this operation speedily, accurately — without splitting the plastic walls — without stripping threads. And — producton has more than doubled.

Ruggedly-built, vibrationless, power-packed, these remarkable drivers have a velvet touch. Torque adjustment can be set within inch-ounces — and stays put month after month.

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MILLERS FALLS COMPANY
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news of the industry

A.M.I. Moves to Elizabeth, New Jersey

Automatic Methods, Inc., manufacturer of precision parts for aircraft and the Auto-tap Lead Screw Tapping Attachment, has recently completed arrangements for moving all its operations to a plant in Elizabeth, New Jersey. The new plant will combine all operations of the three plants operating in Newark into one larger plant having approximately 17,000 square feet of floor space. The plant, located at 965 W. Grand St., Elizabeth 2, N. J., has ample space for expansion, and plans have been made for the extending of the building to provide an additional 10,000 square feet of manufacturing space.

In addition to contract manufacturing of precision parts for the aircraft industry which includes the making of jigs, fixtures, special screws, clamps, rings, stamped parts, and so on, the company is expanding its facilities for the production of the Auto-tap Lead Screw Tapping Attachment.

M & N Hydraulic Press Company Moves to New Quarters

In order to build larger and more diversified hydraulic presses and better serve its industrial customers, the M & N Hydraulic Press Company has moved into new quarters recently constructed at 780 Route No. 3, Clifton, N. J. The firm, formerly known as the

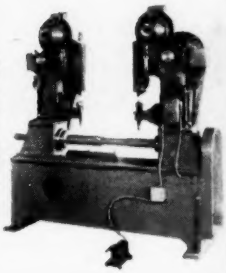
New plant of Automatic Methods, Inc., Elizabeth, New Jersey

Speed Production... Automatically with

T-J

RIVITORS

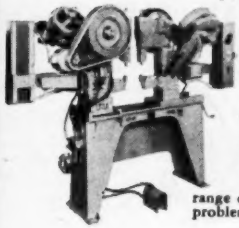
T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.



DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two ⅛" dia. x ⅝" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.

CLINCHORS

T-J CLINCHOR . . . one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets $^{11}/_{16}$" square cased nuts in outside quarter panels, left and right hand.



DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set ⅜" x ⅛" x $^{1}/_{16}$" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.

Boost production . . . save labor with T-J Rivitors and Clinchors for many assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets $^{1}/_{16}$" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36".

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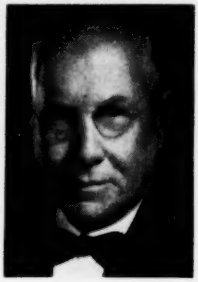
M & N Machine Tool Works, was previously located at 287-293 Allwood Rd., Clifton. According to Nicholas Brodsky, owner, M & N has specialized in designing and building hydraulic presses to meet unique industrial needs for years, and the new completely-equipped quarters will enable the company to construct taller presses with greater capacities ranging from 5 to 2,000 tons.

Anton Smit & Company Elects Jouett Shouse As New Board Chairman

The members of the board of directors of Anton Smit & Co., New York, N. Y., internationally-known industrial diamond firm, recently elected Jouett Shouse, Washington, D. C., to the position of chairman of the board, succeeding the late Leonard J. A. Smit. Mr. Shouse joined the board of directors in 1950 and served in that capacity and as counsel for the company until his appointment as chairman. He is also chairman of the board of the Kinsley Bank, Kinsley, Kansas, and a member of the board of directors of The General Analine & Film Corporation and The General Dyestuffs Corporation, both located in New York.



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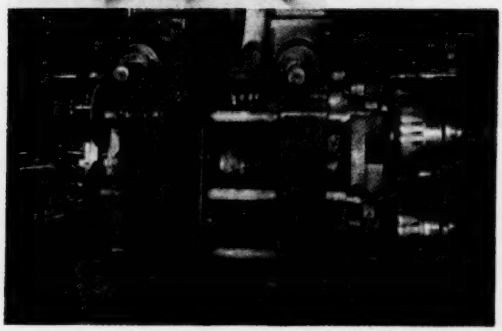

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Machine Repair per year	$25,000	Machine Repair per year	$1200
Tool Cost per Piece	$.00545*	Tool Cost per Piece	$.00213*

(Machine repair and grinding costs not included)

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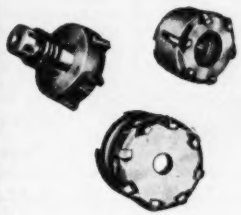

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Hallowell Receives N.M.T.A. Achievement Award

One of American industry's top honors, the annual Achievement Award of the National Metal Trades Association for individual and corporate leadership in industrial relations, was presented recently to H. Thomas Hallowell, Jr., president of Standard Pressed Steel Co., Jenkintown, Pa. The award was made in recognition of the industrial relations program in operation at Mr. Hallowell's plant for promoting progressive management practices and for achieving a closer coordination between industry and educational institutions. The presentation of the award by Charles S. Craigmile, president of the N.M.T.A., climaxed a day-long meeting of 300 metal industries executives at a Mid-Atlantic assembly of the association at the Bellevue-Strat-

H. Thomas Hallowell, Jr. (right), president of SPS, is shown receiving the N.M.T.A. Annual Achievement Award from Charles S. Craigmile, president of N.M.T.A.

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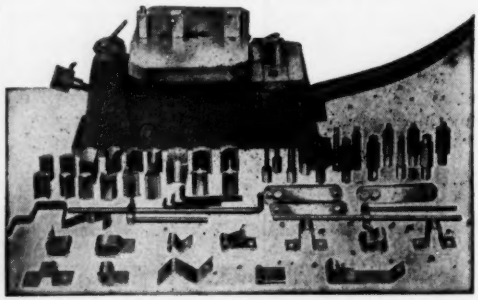

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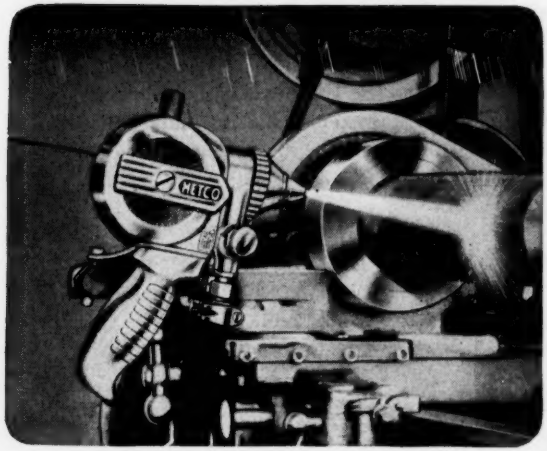

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- Save up to 90% of replacement costs on machine repair jobs,
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It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.*

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

The following names are the property of Metallizing Engineering Co., Inc.

METCO† • Sprabond wire • Metco-Weld

†REG. U. S. PAT. OFF.

METALLIZING ENGINEERING CO., INC.

38-17 30th STREET LONG ISLAND CITY 1, N. Y.

R. J. McWaters,
Metallizing Engineering Co., Inc.
38-17 30th St., Long Island City 1, New York

☐ Please send me more information about metallizing.
☐ Please arrange a demonstration in my shop.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

ford Hotel in Philadelphia. Mr. Hallowell is the fourth American industrialist to receive the N.M.T.A. award.

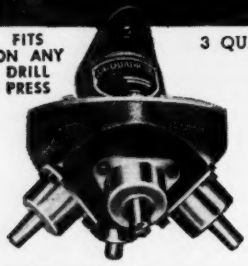
Ipsen Opens Western Branch Office and Warehouse in Burbank

Ipsen Industries Inc., Rockford, Ill., has announced the opening of a new sales and service division in Burbank, California. The branch office and warehouse, located at 120 E. Orange Grove Avenue, will be headquarters for Sidney Terwilliger, sales engineer, and Robert L. Toepfer, recently assigned to the West Coast as service engineer. Manager of the Burbank office will be Mrs. Evelyn Terwilliger. The establishment of a California sales and service headquarters is said to be based on the rapidly growing demand for Ipsen equipment in the West and on the desire to provide maximum maintenance facilities and service to Ipsen users and prospective customers.

In its nationwide operations, Ipsen, manufacturer of automatic heat treating equipment, has branch offices for sales and service in Detroit, Cleveland, Chicago, Kansas City, Philadelphia, and Hartford.

16 HOLES -- THREE PRESSES — ONE OPERATOR!

FITS ON ANY DRILL PRESS



3 QUADRILLS ON 3 PRESSES DO WORK OF 16 SPINDLES AT RING MFG. CO.

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

Investigate this important time and work saver. *Write for Catalog Today*

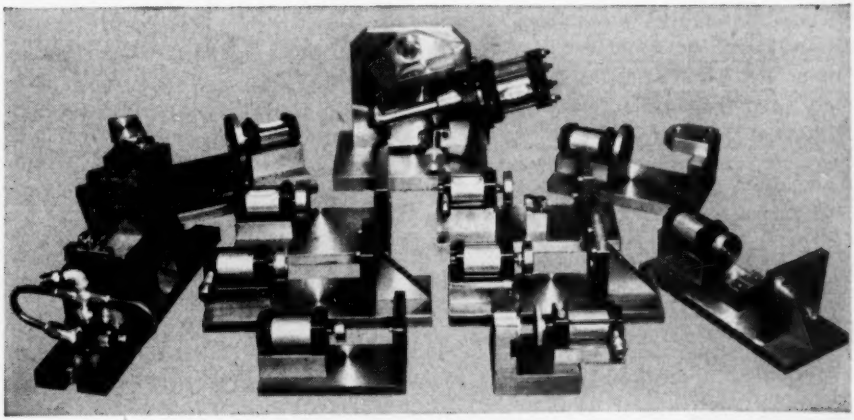
CHICAGO QUADRILL CO.

1844 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

Walter P. Zagar

Walter P. Zagar, founder of Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio, died recently at the age of 65. Mr. Zagar was employed by White Motors Company for 25 years as a ma-

INEXPENSIVE AIR CLAMPS REDUCE FIXTURE LOADING–UNLOADING TIME



A machine tool makes money only when it's cutting metal. Every second it stands idle while a fixture is being loaded or unloaded cuts into the profit picture.

Romec Pump Division, of Lear, Inc. has increased production 265% to 500% in more than 75 machining operations by using Bellows Han-d-Air cylinders to open and close fixtures and other workholding devices.

This midget air cylinder develops 100 lbs. of pressure at 100 lbs. of air. Its 1" stroke is ample for most clamping operations. Its overall size 4" x 1½" square, saves space. A threaded 5/16" piston rod simplifies installation.

The Han-d-Air can be mounted in any position, and is even equipped with provision for pivot mounting. Its cost is so low (only $6.00 each or $66.00 per dozen) it is less expensive to leave it permanently on the fixture than to switch it from one fixture to another.

ORDER . . . .
A TRIAL DOZEN
. . . . TODAY

Write Dep't MMS-753,
The Bellows Co.,
Akron 9, Ohio

The Bellows Co.
AKRON, OHIO

chinist. In 1939, he founded Zagar Tool in a small shop in his garage. The firm now has 130 employees. Mr. Zagar was a member of the American Society of Tool Engineers, the Cleveland Tool & Die Association, the Richmond Heights Community Center, Lodge 37 of the American Fraternal Union, the First Austrian Benefit Society, and the Euclid Chapter of the Fraternal Order of Police.

Modern Collet to Produce Swiss Automatics

Modern Collet & Machine Company has announced that it will produce Tarex single-spindle automatic turret lathes in this country. Two models will be built; namely, the Tar 42 and the Tar 64. The Tar 42 is designed to handle bar stock up to 1⅝ inches with a 3-inch chucking capacity, and the 64 accommodates 3-inch bar stock and has a 6-inch chucking capacity.

Widely used in European machine shops for 16 years, the machines have been built for that market by Tarex Ltd., Geneva, Switzerland. Two members of the Tarex organization, Jaques DuBois and John Boner, will be associated with Modern Collet at least until the machines are in full-scale production. A limited quantity of both machines is now available. Modern Collet & Machine Company, with offices at 401 Salliotte St., Ecorse, Mich., is a wholly-owned subsidiary of Superior Tool & Die Company.

ECONOMIZE Morton-WISE
SPECIFY AND USE Morton
STANDARD FIXTURE CLAMPS AND COMPONENTS . . . . . .
A SAVING OF $62.35 ACHIEVED ON THIS JOB
3 REST BUTTONS COST a leading manufacturer $67.00 to make in his own plant. Now, MORTON-WISE, he buys MORTON RB-3 for $1.55 each.
Greater Savings
Achieved on Jig Feet, Rest Pads and other MORTON Standards. Largest selection of types and sizes of Fixture Clamps and Fixture Details in the Industry. Complete Assemblies or Individual Parts. Highest quality of workmanship and materials maintained. Immediate delivery.
STANDARDS can easily be modified to suit your special application.
Write for: Instructive, Illustrative Catalog. Contains full size tracing templates of each product.
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✓ DRILLING ✓ BENDING
✓ TAPPING ✓ RIVETING

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.
Complete with Foot Control Valve, Air Hose and Fittings . . only **$36.00**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $5.95 Less gauge, $3.25

AIR FILTER
Keeps water and particles out of the regulator and pneumatic tools. $3.00

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . $3.00

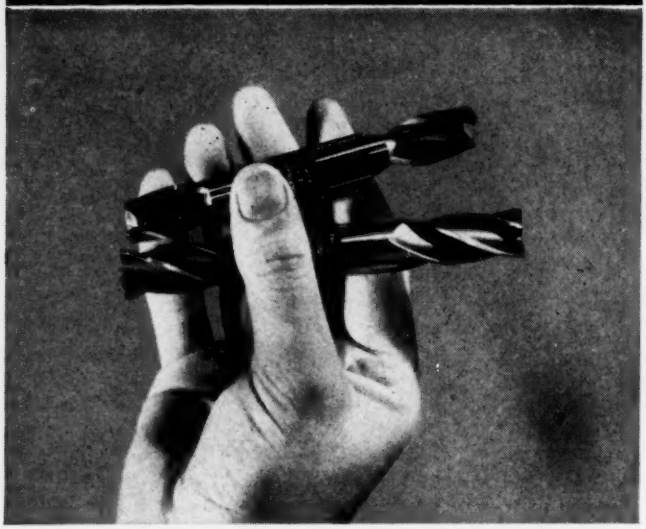
W. R. BROWN CORP. • 2649 N. NORMANDY AVE. • CHICAGO 35, ILL.

Third Annual Methods Improvement Contest

The Industrial Management Society has announced that it is now accepting entries for its Third Annual Methods Improvement Contest to be held in conjunction with the 17th National Time and Motion Study and Management Clinic, November 4, 5, and 6, 1953, at the Sheraton Hotel, Chicago. Student groups in colleges and universities studying industrial engineering, as well as industrial plants and companies, are invited to submit entries in the competition. The society will award first, second, and third place plaques to winning schools and companies. Individuals responsible for the improvements will receive certificates of merit.

Rules and regulations for the 1953 Methods Improvement Contest may be obtained by writing to the Industrial Management Society, 35 E. Wacker Drive, Chicago 1, Illinois.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON Double-End End Mills
FOR DOUBLE DUTY

Weldon Double-End End Mills originally developed by Weldon give you double the service for much less than the cost of two single end mills of equal size. They save production time, too, because to change the mill you simply turn it end for end. Weldon leadership in the cutting tool field has been achieved by many original features which contribute to faster, better performance and longer tool life.

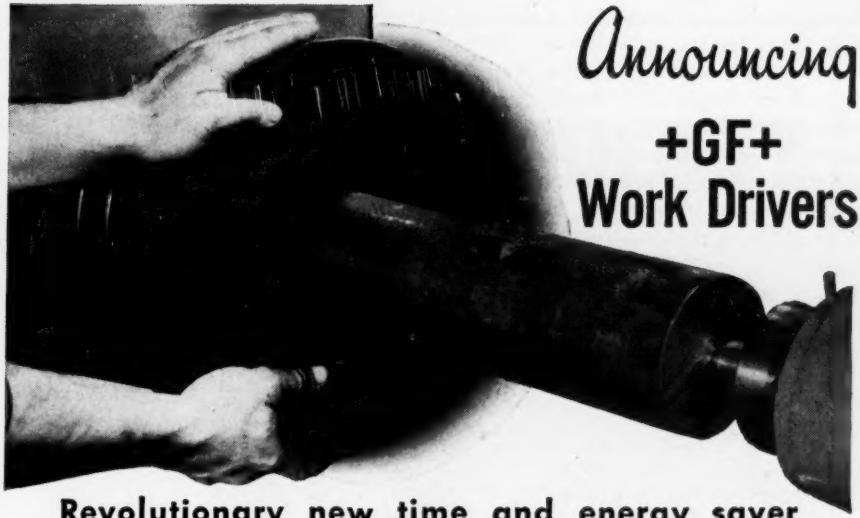
Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

Eighth National Instrument Show

The Eighth National Instrument Show, designed to provide industry with the opportunity to survey the broad field of instrumentation, will be held from September 21 to 25, 1953, at the Sherman Hotel in Chicago. Cooperating with the Instrument Society of America in presenting the technical sessions are the American Institute of Electrical Engineers, Instruments and



Announcing +GF+ Work Drivers

Revolutionary new time and energy saver replaces work dogs on centered lathe work

—SAFER—FASTER—

Work Driver with hood removed

Skinner is proud to announce its appointment as exclusive distributor for the George Fischer line of patented lathe work drivers. The +GF+ consists of 3 eccentric jaws (6 on largest size) which have floating spring action to accomodate smooth or rough bars and forgings. A smooth protective hood covers all mechanism, and also acts as a manual opening and closing device for the jaws. A slight turn of this hood opens the jaws, and holds them open, until work is placed between centers—another turn releases the jaws to grip the work. Any increase in tool pressure and spindle speed automatically increases the holding power of the +GF+. Jaws are easily reversed to accommodate direction of spindle rotation. Skinner carries a complete stock of +GF+ drivers and replacement parts.

Write Skinner or your nearest Skinner distributor for new illustrated folder giving complete details!

NOTE WIDE RANGES!

Type 36 — 1/2" to 1-7/16"
Type 60 — 5/8" to 2-3/8"
Type 90 — 5/8" to 3-5/8"
Type 140— 7/8" to 5-5/8"
Type 200—4-7/8" to 8-1/16"

THE SKINNER CHUCK COMPANY

210 Edgewood Ave., New Britain, Connecticut

Measuring Committee; the American Institute of Physics; the American Society of Mechanical Engineers, Industrial Instruments and Regulators Division; the Institute of Radio Engineers, Professional Group on Instrumentation; and the Scientific Apparatus Makers' Association. The attendance at the exhibit is expected to reach 15,000. Complete information regarding the show can be obtained from the Instrument Society of America, 921 Ridge Ave., Pittsburgh 12, Pennsylvania.

H. P. Buetow Elected President of 3M Company

Herbert P. Buetow, executive vice president in charge of finance, was recently elected president of Minnesota Mining & Mfg. Co., St. Paul, Minn., by the board of directors. Mr. Buetow succeeds Richard P. Carlton who has become vice chairman of the executive committee. Mr. Buetow joined the company in 1926 as auditor and became controller in 1935. He was made treasurer and a director of the company in 1939 and has been an executive vice president since 1949.

Herbert P. Buetow

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Expertly Designed
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DRILLING • TAPPING •
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BORING
Fixed Center Oil Circulating Spindle Head with Vertical Adjustment Spindles—Designed mainly for high speeds.
Standard Fixed Center Construction. Bushing Guide Rod Holes and Lifter Rod Holes with Vertical Adjustment Spindles.
We manufacture, at lowest possible price, all types of multiple spindle fixed center adjustable and lead screw tapping heads.
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SINCE 1915
Close Fixed Center Multiple Head with Suspended Bushing Plate.
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Why pay fancy prices for MAGNETIC CHUCKS?

Supplied with connections for either 110 or 220 volts D.C.

Grip Work Tightly for Wet or Dry Grinding

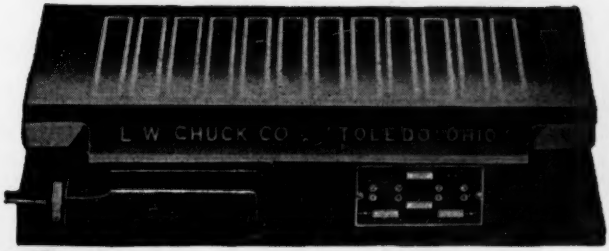
Guaranteed Waterproof

5¾" x 13" **$55.37**

6½" x 18" **$73.40**

8" x 24" **$146.00**

10¾" x 37" **$280.00**



DEMAGNETIZERS

A single pass over the stationary poles completely demagnetizes work. 110 volt A.C. Model B-2 for large work, 7¾" x 12½" x 6¾". Ship. wt. 55 lbs. ——— **$73.45**

Model J-1 for small work, 7¼" x 7¼" x 6¾". Ship. wt. 35 lbs. ——— **$47.83**

RECTIFIERS

A.C. input 110 volts. D.C. output 110 volts. P-1 for 5¾" x 13" chuck 0.8 amps. ——— **$45.04**

P-2 for 6½" x 18" chuck 1.0 amps. ——— **$52.30**

P-3 for 8" x 24", 10¾" x 37" chuck 3.0 amps. ——— **$69.73**

DEMAGNETIZING SWITCHES

For 5¾" x 13" and 6½" x 18" sizes ——— **$10.35**

Field discharge type for 8" x 24" and 10¾" x 37" ——— **$18.90**

Order from Your Industrial Supply Distributor or Order Direct, Giving Name of Your Distributor.

IMMEDIATE DELIVERY

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY

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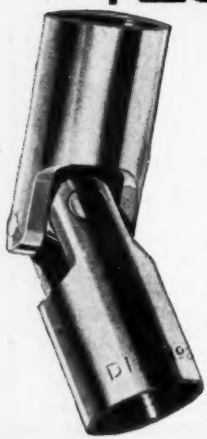
Mr. Buetow is a former vice president of the Controllers Institute of America, a former trustee of the Controllership Foundation, president and a director of the First Merchants State Bank, and a director of the First Trust Company. He has been a member of the Minnesota Governor's Advisory Council on Unemployment Compensation since 1945.

Peter A. Frasse to Construct New Office and Warehouse Building in Hartford

Peter A. Frasse & Co., Inc., New York, N. Y., who for many years has maintained a sales office in Hartford, serviced by its New York warehouse, is now constructing a new office and warehouse building located on Locust Street, Hartford, Connecticut. The new building will be devoted to the distribution of alloy, stainless, and cold finished carbon steels and tubing in the Connecticut and New England area. Completely modern in design and serviced by the latest in materials handling equipment, the new building, it is claimed, will enable the firm to service the needs of steel users in the area with utmost speed and efficiency. Deliveries, wherever feasible, will be made by Frasse trucks, operated by Frasse personnel.

Parking facilities will adjoin the new building, and the balance of the firm's tract will be available for future expan-

6 GOOD REASONS
FOR CHOOSING. . .
LOVEJOY
UNIVERSAL JOINTS



★ Concentricity guaranteed to .001.
★ Rivets ground flush with body for close quarter work.
★ Greater angle of operation with maximum bearing surface and strength.
★ No binding, backlash or inplay of pins.
★ Highest grade, heat-treated alloy steel.
★ Exceed Armed Forces rigid requirements.

Available in 13 sizes. Diameters ½" to 4". Lengths 2" to 10⅝".

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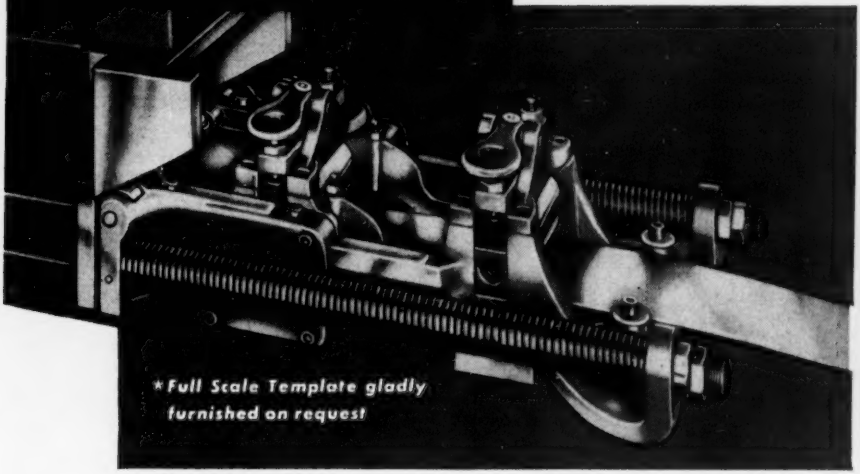
LOVEJOY FLEXIBLE COUPLING CO.
5007 W. LAKE STREET CHICAGO 44, ILLINOIS
Also Mfrs. Lovejoy Flexible Couplings and Lovejoy Variable Speed Transmissions

No Jockeying with Dickerman Die Feeds



*Full Scale Template gladly furnished on request

Set-up men and press operators all know how critical starting a new coil can be into a complicated progressive die. Smash-ups at this point are costly both in down time and die repairs.

No need for both hands on the On and Off Control Buttons to "jockey" a new strip into position with Dickerman Die Feeds®. On single trip or automatic operation, the feed advance is positive and accurate. Adjustments made for single trip operations when feeding a new coil or developing a new die, remain constant when the press is switched to automatic operation.

Experienced tool design and production men find this an invaluable feature of Dickerman Die Feeds® in addition to their dependability and accuracy.

H. E. **DICKERMAN** MFG. CO.

322 Albany St. • Springfield, Mass.

sion. The enlarging of the Frasse organization in the Hartford area constitutes a major step in the firm's plans for expansion and modernization.

New Diamond Products Company Formed

Clayton S. Parsons, formerly New England and New York State manager for J. K. Smit & Sons, Inc., has formed his own company, known as Parsons Diamond Products, Inc., for the manufacture and sale of industrial diamond tools, diamond wheels, and diamond abrasives.

Mr. Parsons, who will act as president and treasurer of the new firm, has served as chairman of the Hartford Chapter of the American Society of Tool Engineers, is a member of the Society of Carbide Engineers, and has been actively associated with the industrial diamond business for 20 years.

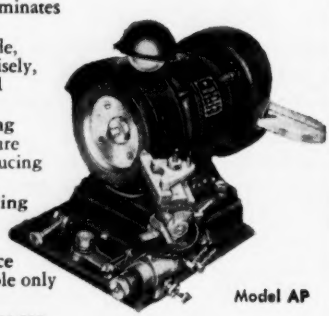
Rockwell B. Ward, formerly associated with J. K. Smit & Sons, Inc., as sales representative, will serve as vice president. Mr. Ward is a pioneer in the development and application of diamond lapping compounds and abrasives and has had more than 15 years of sales experience.

Parsons Diamond Products, Inc., has its main offices and plant at 968 Farmington Ave., Clark Bldg., West Hartford, Connecticut.

For Lowest Cost Precision Grinding!

New Moderately Priced Precision Grinder Ideal for the Average Plant:

1. **Saves Diamond Wheels!** Tool is rocked across wheel face — eliminates scoring and grooving.
2. **Real Precision!** All front, side, and top angles can be set precisely, in both vertical and horizontal planes.
3. **Saves Valuable Hard Cutting Tools!** Eliminates rigid pressure and localized overheating, reducing the danger of cracks.
4. **Keen Durable Straight Cutting Edges!** Perfect grinding to exact angles.
5. **Unskilled Operators Produce Fine Work!** Previously possible only on high priced machines.
6. **Moderate Price!** Average plant can do its own precision grinding at low cost.



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Bench and Floor Types—Wet or Dry Models

Prices from $274.50 up

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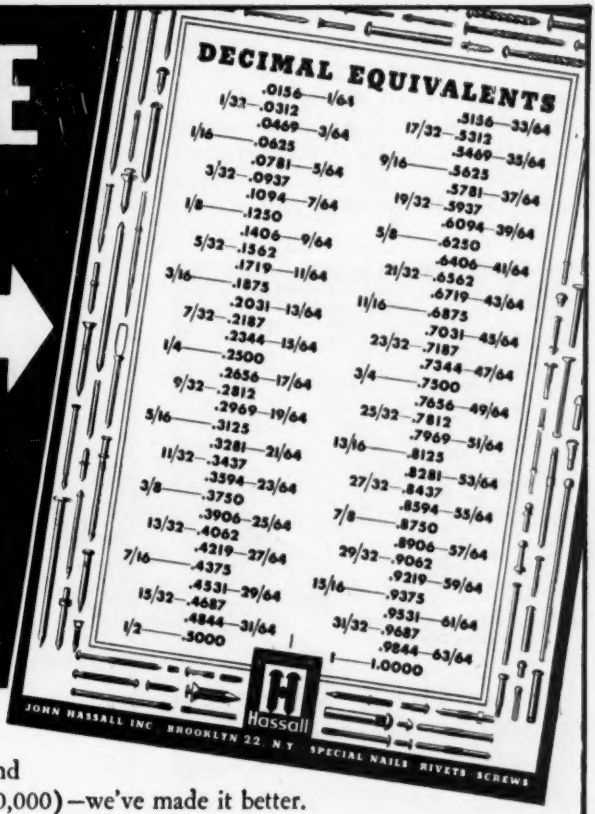
WRITE FOR FREE Hassall decimal-equivalent wall chart



In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source of cold-headed parts.

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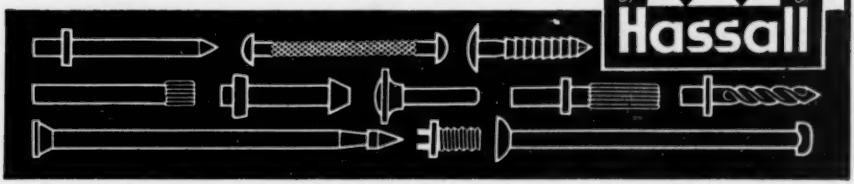

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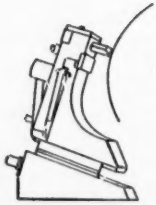
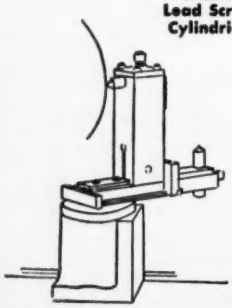
WHEEL DRESSERS

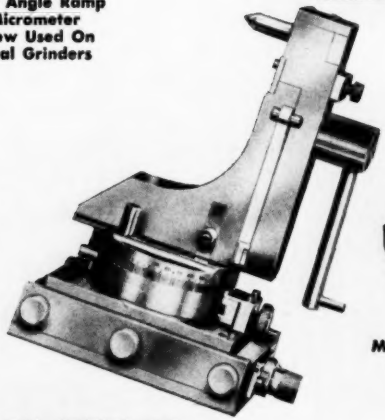
dress two angles tangent to a radius in one continuous motion

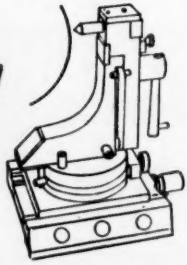


New Solid Angle Ramp With Micrometer Lead Screw Used On Cylindrical Grinders



Form-master Low Cost Angle Or Radius Dresser

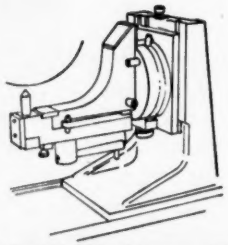




Model "REC" on Surface Grinders up to 14" Diameter Wheels

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

With the "Fluidmotion" Dresser, you can dress two angles tangent to a radius—using one handle in one continuous motion. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.



Under the wheel fixture with micrometer feed for use on surface grinders

J & S TOOL CO., INC.
645 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Highway Route No. 10)

J&S TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop Time Savers booklet.

J & S Tool Co., Inc. distributors are located in principal cities

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Ed Schuerer Sales, phone GL 3-2960

CANADA, TORONTO 5, ONT.
J. H. Ryder Machinery Co., phone Princess 6611

New Giddings & Lewis Officers Appointed

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has announced the appointment of Donald M. Laflin as vice president in charge of sales. Mr. Laflin has been associated with the company for 20 years, his first assignment being eastern district sales manager. In 1949, he was made general sales manager and has held this position until his recent appointment. Edgar L. McFerren, former chief engineer, has been elected vice president in charge of engineering. Mr. McFerren has been with the company for 17 years and has held many positions within the firm.

(Upper left) Donald M. Laflin, (upper right) Edgar L. McFerren, (lower left) Milton H. Nichols, and (lower right) David F. Robinson

The company also announced that Milton H. Nichols, former northeast-

ern district sales engineer, has been named export sales manager. Mr. Nichols will be located in Paris. David F. Robinson, former vice president and sales manager of Rudel Machinery Co., Inc., New York, has been named northeastern district sales engineer, succeeding Mr. Nichols. Other appointments in the company are: Ralph A. Breitung, secretary and treasurer; Morton R. Swift, controller and assistant secretary-treasurer; Fred C. Freund, works manager; William H. Sorenson, assistant to the president; and Harry C. Soukup, superintendent.

Lodge & Shipley Elects Officers and Directors

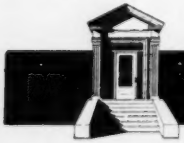
At the annual meeting of the Lodge & Shipley Co., Cincinnati, Ohio, William L. Dolle, George E. Fee, Walter F. Grote, Thomas T. Kling, Lawrence H. Kyte, James B. O'Donnell, Ralph W. Miller, J. Herbert Myers, and Louis B. Weber were reelected to the board of directors. An organizational meeting of the directors was also held at which the following officers were elected: William L. Dolle, president and treasurer; J. Herbert Myers, vice president and sales manager; Thomas T. Kling, vice president and works manager; Ralph W. Miller, secretary and controller; W. J. Hengehold, assistant secretary; and Joseph A. Brinkman, assistant treasurer.

PRECISION CIRCULAR CUTTERS

MEYCO carbide tipped and solid carbide cutters have earned an enviable reputation in plants where long tool life and precision workmanship is a MUST.

These cutters can be furnished in various diameters and thicknesses to meet the requirements of individual applications.

Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal.



W. F. MEYERS CO., INC., BEDFORD, INDIANA

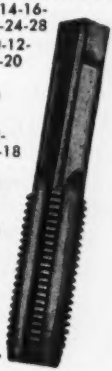
Sid Tool Company

WHY WAIT FOR SPECIAL TAPS?

. . . Has them IN STOCK for IMMEDIATE DELIVERY!

HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

- ***SPECIAL AND LEFT HAND DIES IN STOCK***

Prices on Application—We are always adding new sizes

NOTE: Oversize—Undersize—Metric—64th—and 32nd Size Taps Available for Quick Delivery.

DEALER INQUIRIES INVITED

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SID TOOL COMPANY, INC.

CUTTING TOOL SPECIALISTS

126 LAFAYETTE STREET • NEW YORK 13, N. Y.

PHONE: BE 3-4270

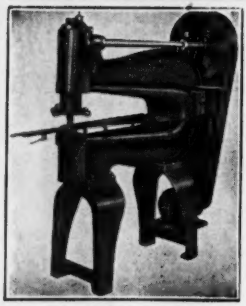
Hydraulic Drill Unit Division Formed by Rockwell

Rockwell Manufacturing Company has set up a separate division in its plant at 400 N. Lex ngton Ave., Pittsburgh, Pa., for the manufacture and sale of a new air-hydraulic drill unit. This is the first power tool manufacturing operation to be conducted by the company in its Pittsburgh facilities. The new division, called the Drill Unit Division, is headed by Ralph Caouette, general manager of the firm's Register Division.

Illustration showing spindle runout being checked closely on new Rockwell air-hydraulic drill unit

The drill units, originally developed by the company's Delta Power Tool Division, are assembled and tested in a new air-conditioned room equipped with tiled flooring. Machining of parts is carried on in the plant's regular machine shop, to which some extra machinery has been added for the purpose. Assembly of the units is carried on by specialized, highly-skilled personnel.

SAVAGE
NIBBLING MACHINES



CAPACITIES UP TO 3/4"

—

ASK FOR FREE BULLETIN "I"

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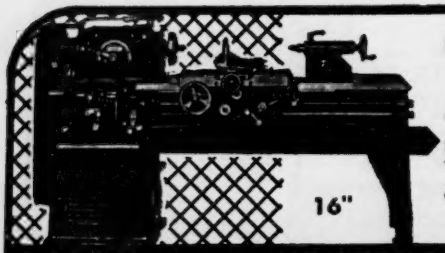
"NIBBLE YOUR COSTS"
FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

W. J. SAVAGE COMPANY
Knoxville *Since 1885* Tennessee
PIONEER MFRS. OF NIBBLING MACHINES



CARROLL AND JAMIESON LATHES

● **This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.**

Write today for descriptive bulletin 39-A-10.

THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO, U.S.A.

...alf the time with Heller NUCUT wavy teeth Coarse, fine and extra-fine teeth all combined on one file for fast, deep, double-action cutting. Even, scratch-free finish. No chattering. Longer file life. ORDER FROM YOUR LOCAL DISTRIBUTOR

HELLER BROTHERS SINCE 1836

American-Swiss
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THESE THREE FAMOUS FILES ARE MADE ONLY BY HELLER BROTHERS

HELLER BROTHERS COMPANY
America's Oldest File Manufacturer
NEWCOMERSTOWN, OHIO

Metal Cutting Saws
...by Reltool

Precision Made: Reltool Circular Saws of various types are made by modern precision methods of fine, high-speed tool steels. Hollow ground to required tolerances, they are slightly concave for ample clearance to assure free running in deep cuts.

A Reltool Saw for Every Need: In addition to Plain Metal Slitting Saws, Reltool makes Metal Slitting Saws with Staggered Teeth and Side Clip Clearance, Screw Slotting Saws, Formed Tooth Saws, Fine and Coarse Tooth Tenacious Saws, Plastic Saws, and Circular Shears.

The RELTOOL Line Includes:
Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

Write for Reltool Net Price Catalog 53.

Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS

4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

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Gilbert S. Simonski Company Changes Name

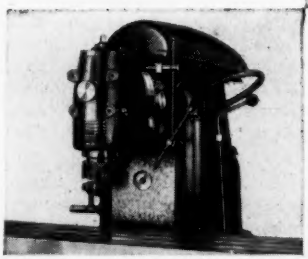
The Gilbert S. Simonski Co., Neshaminy, Pa., manufacturer of Lucifer electric furnaces, has announced a change in name to Lucifer Furnaces, Incorporated. Clement Dinon has been appointed president of the corporation, Simon Fahrer is treasurer, and Anthony Lipsi has been reappointed as general manager. Mr. Lipsi will be in full charge of design and production. Founded in 1943 by the late Gilbert S. Simonski of Philadelphia, the firm designs and builds electric furnaces for heat-treating purposes.

Third European Machine Tool Exhibition

The Third European Machine Tool Exhibition, organized by the European Committee for Cooperation of Machine Tool Industries, is scheduled to be held in Brussels, Belgium, September 4 through 13, 1953. Twenty-one American manufacturers will exhibit their products at the show. The products of over 700 manufacturers from 11 countries will be exhibited, and more than 350,000 square feet of space will be occupied by approximately 2,500 machines on demonstration.

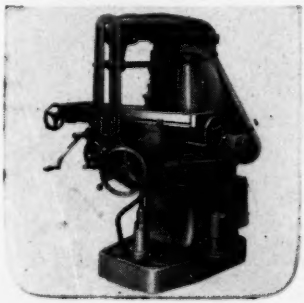
In addition to machine tools and portable tools for the working of metals, the exhibit will include measuring, controlling, and testing instruments; welding equipment; die casting machines; heat-treating equipment; and electrical, pneumatic, and other auxiliary equipment. Further technical information, as well as a folder giving general information for visitors, may be obtained by writing to Leon G. Rucquoi, Technical Consultant to the Belgian Metal-working Industry, 30 Rockefeller Plaza, New York 20, N. Y.

Swedish Craftsmanship!



Saja Vertical Milling Attachment

The Saja "Plain" Milling Machine



the SAJO "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:**
3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ **Extra Equipment:**
Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

Table Size	41½" x 9¼"
Longitudinal travel: Plain Miller	24½"
Universal Miller	27½"
Transverse travel	8¼"
Vertical travel	19"
12 spindle speeds	36-1540 RPM
Table feeds	12
Taper in spindle	No. 40 NMT
Main motor	3 HP

Precision anti-friction bearings on spindle and gear shafts
One-piece column and base
Net weight—2200 lbs.

Write for Catalog

NO PRIORITY—— PROMPT DELIVERY——ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-H MAMARONECK AVE. WHITE PLAINS, N. Y.
DEALERS IN PRINCIPAL CITIES

ELECTS NEW OFFICERS AND EXECUTIVE COMMITTEE MEMBERS

George H. Sanborn

R. B. Holmes

Fred R. Eberhardt

DURING the 37th Annual Meeting of the American Gear Manufacturers Association which was held at The Homestead, Hot Springs, Virginia, May 31 to June 4, new officers were elected for one-year terms and four members of the association were elected to serve as new members of the Executive Committee. These new officers and members of the Executive Committee are as follows: George H. Sanborn, Sales Manager, Fellows Gear Shaper Company, Springfield, Vermont, was elected President; R. B. Holmes, General Manager, Philadelphia plant, Link-Belt Company, was elected Vice President; and Fred R. Eberhardt, President, Eberhardt-Denver Company, was elected Treasurer.

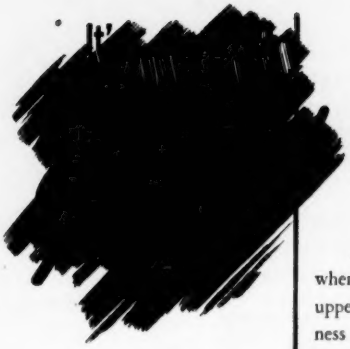
E. C. Denne, Consultant and Manager, Gear Department, United Engineering and Foundry Company, Pittsburgh, Pennsylvania, was elected to the Executive Committee as were R. E. Smallwood, Project Engineer, Industrial Division, Dominion Engineering Company, Ltd., Montreal, Canada; Raymond B. Tripp, Executive Vice President, Ohio Forge and Machine Corporation, Cleveland, Ohio; and Thomas A. Jones, President, W. A. Jones Foundry and Machine Company, Chicago, Illinois.

E. C. Denne

R. E. Smallwood

Raymond B. Tripp

Thomas A. Jones



when considering your new machines, *demand*

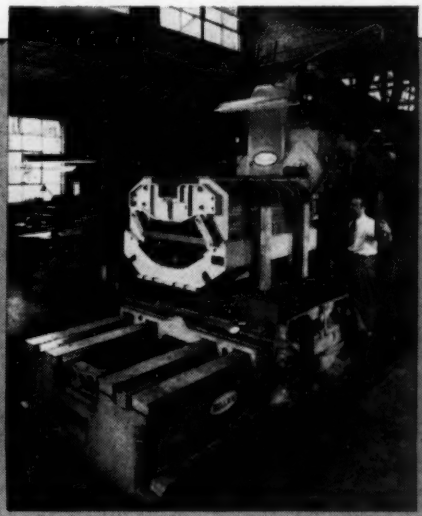
this 4-way bed Bullard Horizontal Boring, Milling and Drilling Machine

At Best Tool and Engineering Company, Detroit, Michigan where they are making Packard Motor Car Co. fixtures for milling upper half of aircraft engine crankcases, they rely upon the ruggedness and accuracy of these Bullard Horizontal Boring, Milling and Drilling machines for the finest of workmanship in their products.

Even though these fixtures are not a production run, Best Tool and Engineering have found that the versatility and reliability of these Bullard machines provide a profitable, precision method for machining.

A satisfied customer is the best proof of a machine's performance and ability.

- Rigidity of BULLARD 4-Way bed CONSTRUCTION
- Advantages of BULLARD NON-METALLIC bearing surfaces
- Smooth operation from HYDRO-DYNAMIC Coupling Drive
- Machine versatility BULLARD inbuilt ACCURACY.



The **BULLARD** *Company*

BRIDGEPORT 2, CONNECTICUT

Metal-Working News in Brief

E. C. Warrick, chief engineer of Delta Manufacturing Division of Rockwell Manufacturing Company, has been promoted to chief engineer of the firm's Power Tool Engineering Division. In his new position, Mr. Warrick will be responsible for standardization, research, advanced development, and coordination of Delta, Crescent, and Homecraft plant engineering work.

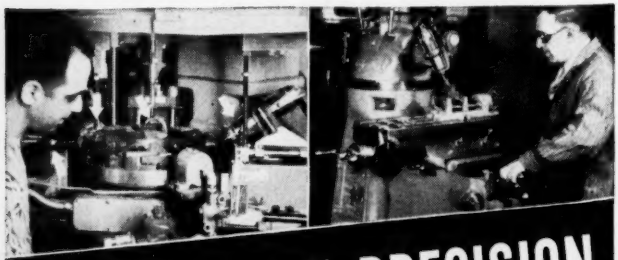
Industrial Products Division of Westinghouse Air Brake Co., Wilmerding, Pa., has announced the appointment of **E. M. Cook** as sales engineer in the Cleveland district. Mr. Cook will make his headquarters at 1116 Midland Bldg., Cleveland 16, Ohio.

— o —

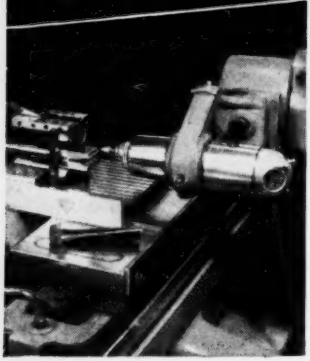
Metal Carbides Corp., Youngstown, Ohio, has announced the opening of sales offices at 325 Bankers Trust Bldg., Indianapolis, Ind., with **Frank C. Thompson, Jr.,** as resident sales engineer and at 743 N. 4th St., Milwaukee, Wis., with **Charles Roman** as resident sales engineer. **Fred Winter, Jr.,** has been appointed sales engineer at the Boston, Massachusetts, sales office.

— o —

J. M. Hendrickson, formerly director of mechanical research for the Eljer Company, has been appointed vice president of The Pannier Corp., Pittsburgh, Pa. In his new position, Mr. Hendrickson will be in charge of research and development.



LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¾ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

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PRECISE PRODUCTS CORP., 1345 Clark St., Racine, Wis.

Precise GRINDER-MILLERS

SANFORD BENCH SURFACE GRINDER
MODEL SG

*for Wet*or Dry Grinding!*

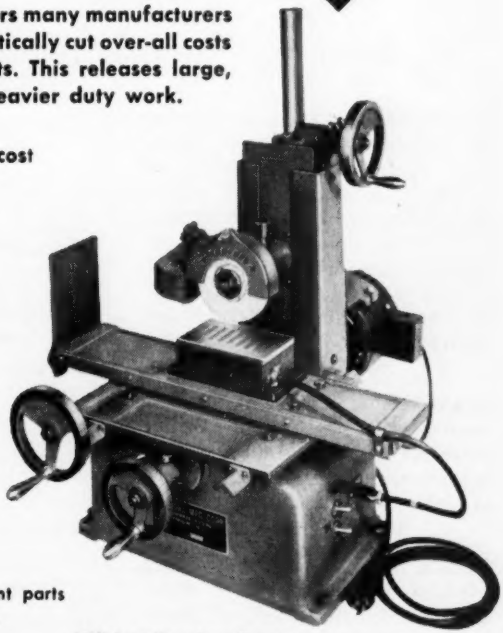
PRECISION • SPEED • SENSITIVITY

A *low cost*, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the *only* low cost Bench Surface Grinder that

- **Grinds to less than .0001" tolerances**
- **Operates without vibration**
- **Assures long life because Meehanite castings are used in its construction**



SPECIFICATIONS—4" traverse —8" longitudinal—6" vertical under 4" wheel. Approximate weight 160 lbs.

Complete details are included in illustrated bulletin. Send for your copy today.

Reconditioning facilities, replacement parts and special attachments are available. Send for price list.

**With optional equipment*

SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

Metal-Working News in Brief

The Bellows Co., Akron, Ohio, has announced the appointment of **W. W. Smith** and **David J. Trepanier** as field engineers. Mr. Smith will make his headquarters at the company's office at 3030 Euclid Ave., Cleveland, Ohio, and Mr. Trepanier will work out of the company's office at 220 W. Market St., Akron, Ohio.

S. C. Johnson & Son, Inc., Racine, Wis., has announced the appointment of **John C. Tarvin** as field sales manager and **Raymond F. Farley** as western regional supervisor. In his new post, Mr. Tarvin will supervise the marketing and distributing of Johnson's industrial products, which include metal-working lubricants and coolants, product finishes, corrosion inhibitors, furniture waxing compounds, and agricultural waxes, throughout the United States. Mr. Farley, who replaces Mr. Tarvin as western regional supervisor, will supervise the selling of the company's industrial products throughout the West-Central states.

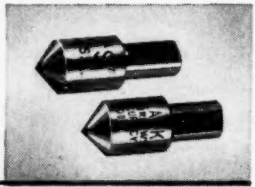
—o—

John D. Williams has been elected vice president and general manager of Rollway Bearing Company, Inc., succeeding **William B. Smithers** who resigned recently. Mr. Williams also holds the same positions in Lipe-Rollway Corporation which owns 100 per cent stock interest in Rollway.

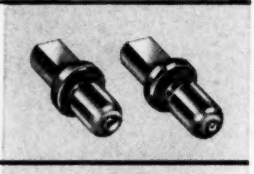
Call on CLARK

for All Your "Rockwell Testing" Needs

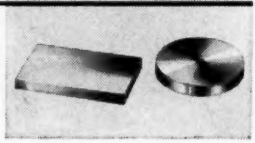
CLARK Diamond Cone Penetrators are exactly right for your "Rockwell" hardness tester, whether or not it bears the CLARK name. Every step in their manufacture, from careful diamond selection to expert lapping, leads to a precision product that will give you precision results. Yet CLARK Diamond Penetrators cost surprisingly little.



CLARK Steel Ball Penetrators, for accurate "Rockwell testing" of unhardened steel, cast iron, brass, bronze, and similar materials, are available in all standard sizes.



CLARK Test Blocks, in various hardness grades, provide a quick, sure, and simple method of checking the accuracy of your "Rockwell" type hardness tester.



Write today for descriptions and prices.

CLARK INSTRUMENT, INC.
10204 Ford Road • Dearborn, Mich., U.S.A.

CLARK

BAY STATE

BAY STATE SALUTES CATERPILLAR TRACTOR CO. . . . for brilliant design in this No. 6 shovel. Here indeed is a remarkable achievement of surging power with maximum compact maneuverability.

Each day, BAY STATE abrasive products play important parts in producing up-to-the-minute mechanical triumphs such as this. Each day too, more manufacturers are realizing the tremendous faith they can place in BAY STATE'S complete line of abrasive products and its excellent engineering service.

Call your BAY STATE distributor for the solution to any problem that involves your production grinding.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Massachusetts

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

MANUFACTURERS OF ALL TYPES OF QUALITY GRINDING PRODUCTS

Metal-Working News in Brief

B. C. Ames Co., Waltham, Mass., has announced the appointment of **G. W. Brunton & Son, Inc.**, 2315 Elmwood Ave., Kenmore 17, N. Y., as exclusive agent in the Buffalo, Rochester, Syracuse, and Elmira, New York area. The company will act as sales representative for Ames micrometer dial indicators and micrometer dial gages.

Kennametal Inc., Latrobe, Pa., has announced the appointment of **Jerome G. Brady** as manager of the Pittsburgh district. Mr. Brady was formerly a sales engineer for the firm in the northern New York area.

— o —

The Timken Roller Bearing Co., Canton 6, Ohio, has announced a series of promotions brought about by the retirement of **J. A. Riley**, secretary-treasurer. **H. E. Markley**, assistant secretary, has been elected secretary; **G. L. Deal**, assistant treasurer, has been appointed treasurer; **B. R. Powell**, chief cost accountant, has been named assistant secretary; and **R. A. Gulling**, systems supervisor, has been elected assistant treasurer.

— o —

The election of **Dr. H. N. Stephens** as vice president in charge of central research has been announced by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Dr. Stephens has been in charge of the central research laboratory since 1937.

CAMPBELL Abrasive Cutting Method Sets New Cut-Off Standards

● 8" x 8" No. 8740 Chrome Molybdenum steel took 210 minutes to cut the old-fashioned way, but a CAMPBELL NO. 480 Abrasive Cutter made a burn-free, smooth, close-tolerance cut in only 18 minutes.

CAMPBELL makes abrasive cutters for any hardness or shape of metal with a range up to 8" diameter solids and 20" diameter tubular. Their speed, accuracy, and quality of cut is unsurpassed.

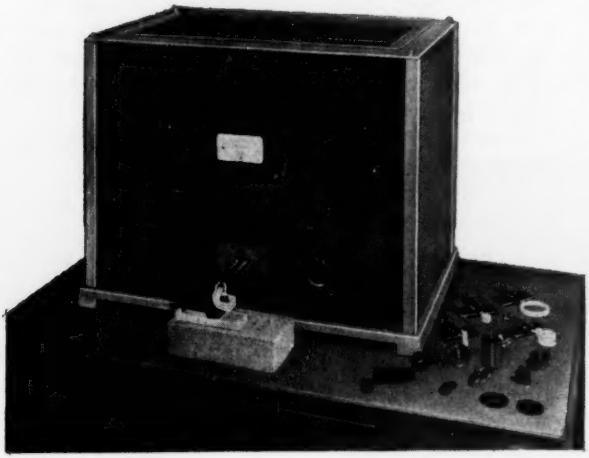
Write for
ACCO *"Principles of Abrasive Cutting"*

CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE
931 Connecticut Ave., Bridgeport, Conn.

CAMPBELL
Abrasive Cutters and Nibblers

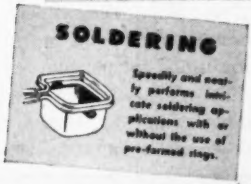
Lepel presents

A Low Cost PORTABLE HIGH FREQUENCY Induction HEATING UNIT



BRAZING
Permits wide choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

HARDENING
Heat localized evenly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.



- **SMALL AND COMPACT** Conveniently operated on bench or table—no mounting necessary.
- **ECONOMICAL OPERATION** No special power installation required. Operates on 110 volts, 60 or 50 cycle line at unity power factor.
- **FULLY GUARANTEED** Guaranteed for continuous duty cycle and stated performance.

This versatile unit is priced so low that every shop may now take advantage of modern induction heating techniques to improve quality and to increase production. Its simplicity of operation eliminates the need for skilled personnel.

The Lepel Model 2 KW will meet the requirements of machine shops, toolrooms, research laboratories and educational institutions. It is especially suitable for hardening, brazing and soldering small parts of either ferrous or non-ferrous metals.

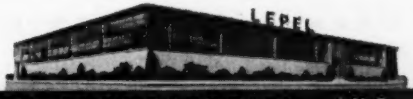
Complete unit with line connection and load coil.

$870.
f.o.b. factory

WILL HEAT TO 1500° F.

1/8"	steel rod	1"	length	in	approx.	1	second
1/4"	"	"	"	"	"	3	seconds
1/2"	"	"	"	"	"	15	seconds
1"	"	"	"	"	"	60	seconds

Will melt 4 ounces of brass or steel in 4 minutes.
Equally well suited for heating of non-ferrous metals.



LEPEL HIGH FREQUENCY LABORATORIES, INC.
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission
Write for Lepel Catalog MMS-7

Metal-Working News in Brief

Clearing Machine Corp., Chicago, Ill., has announced the appointment of **Jack Fredericks** as representative in Detroit and vicinity; **William McKeown** to handle Toledo and northern Ohio; and **Carl Benson** to cover southern Ohio and eastern Indiana, working out of the company's Hamilton, Ohio, plant.

— o —

The appointment of **Erhardt C. Koerper** as works manager has been announced by Ampco Metal, Inc., Milwaukee, Wis. In his new position, Mr. Koerper will direct the company's entire production activity.

Van Norman Co., Springfield, Mass., has announced the appointment of **Roger S. Pyne** as vice president in charge of the machine tool division. Mr. Pyne has been associated with the company for 39 years and was formerly sales manager of the machine tool division.

— o —

The promotion of three of its central research department members has been announced by Minnesota Mining & Mfg. Co., St. Paul, Minn. **Dr. Matthew W. Miller** was named business manager and **Dr. Alvin M. Borders** and **Dr. Harold M. Scholberg** were named associate directors of the central research department.

Your production costs — and profits — are materially affected by the sharpness and efficiency of your production tools. Accepted by industry the world over, Grand Rapids No. 10 and No. 12 Motor-Driven Universal Cutter Grinders meet these exact requirements and are now available for delivery upon short notice. Larger Hydraulic Feed Universal and Tool Grinders are available for later delivery. Write today for full data on models to meet your needs.

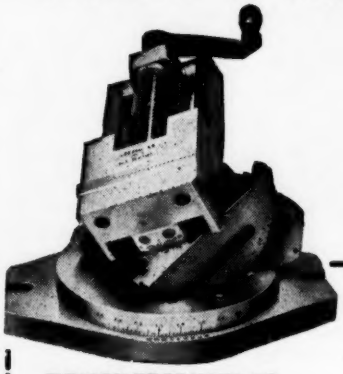
GRAND RAPIDS GRINDERS

GALLMEYER & LIVINGSTON CO.
308 Straight Ave., Grand Rapids, Mich.

MANUFACTURERS OF SURFACE GRINDERS, CUTTER AND TOOL GRINDERS, TAP AND DRILL GRINDERS.

GALLMEYER & LIVINGSTON
PRECISION BEYOND QUESTION

PICTURE OF ANGLE JOB SETUP WITHOUT



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UNIVERSAL VISE

Speedy, precision angle set-ups are simple, fast and economical when you use Wesson's 3-way Universal. Wesson angle vises eliminate many costly special fixtures.

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Ferndale(Detroit20),Mich.

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

Name and Title

Firm Name

Address

City State

Metal-Working News in Brief

The Billings & Spencer Co., Hartford 1, Conn., has announced the appointment of **Thomas E. McGuire** as sales representative in part of Iowa, northern Illinois, and sections of Indiana and Wisconsin. Mr. McGuire will make his headquarters in the Billings Chicago office located at 100 S. Jefferson Street.

E. W. Bliss Co., Canton, Ohio, has announced the election of **Richard Y. Moss** as vice president and manager of the Canton, Ohio, division; **Robert Shannon** as vice president and manager of the Hastings, Mich., division; and **Albert E. Whyman** as vice president in charge of European operations.

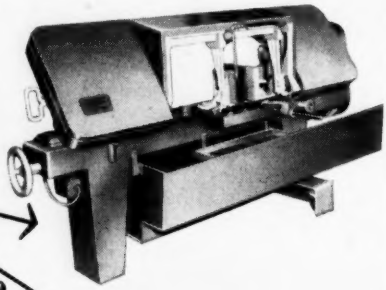
— o —

Kurt Orban Co., Inc., New York, N. Y., has announced the appointment of **Miner Machine Co.**, Denver, Colo., as distributor of its line of German-made machine tools in Colorado, Wyoming, Utah, and New Mexico. Six different types of machine tools have been installed in the Miner showroom for demonstration purposes.

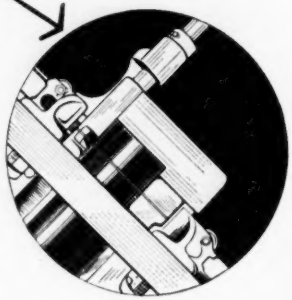
— o —

A. F. Davis, vice president and secretary of The Lincoln Electric Co., Cleveland, Ohio, has been elected president, for a two-year term, of the Alumni Association of the Ohio State University. Mr. Davis graduated from Ohio State in 1913 with a degree in electrical engineering.

you can see the CUTTING ACTION



Kalamazoo **METAL CUTTING BAND SAW**



Yes . . . you can look directly down into the cut as it's being made, giving you instant warning of any need for adjustment. And blade wear and dullness can be quickly detected, too. Result? Faster, cleaner precision cutting, longer blade life.

Investigate the many other exclusive Kalamazoo Band Saw features that give you lowest cost metal cutting. Three sizes, all available with coolant equipment and casters.

MACHINE TOOL DIVISION

Kalamazoo **TANK and SILO CO.**

710 HARRISON ST., KALAMAZOO, MICHIGAN

The only perfect, mathematically designed boring tool on the market *for mass production boring and internal threading*

THE BOKUM BORING TOOL

BORE MORE HOLES IN LESS TIME

The cutting heads of Bokum Tools were designed to give you fast performance, economy in production, and efficiency in results.

Repeated resharpenings (one face only) does not change the scientifically-engineered helical form. Thus the clearance remains constant throughout life of tools — and they do have a long life.

Available in:

- Super high-speed steel
- Carbide-tipped
- Solid tungsten carbide
- For boring holes from 1/16" diameter up.
- Put up in sets of desired tool sizes and types, in quantity assortments to suit.
- Special holders for specific uses.
- Send for complete catalog.

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

DEPT. B • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

Metal-Working News in Brief

New representation for Imperial Stamp & Engraving Co., Chicago, has been arranged with **Edge-Rite Tool Co.**, New York, who cover the Delaware, New Jersey, Maryland, eastern Pennsylvania, and southern New York machine tool field. Edge-Rite will handle the complete Imperial line of marking equipment, including hydraulic marking machines, pneumatic marking machines, metal marking typewriters for name plates, steel stamps, roller dies, and typeholders with type, die, and mold engraving and numbering heads.

— o —

Firth Sterling Inc., Pittsburgh, Pa., has announced the opening of a branch office at 1120 Prudential Bldg., 1100 Holcombe Blvd., Houston 25, Texas, to serve as headquarters for the new southwestern district. **Robert B. Lewis,** Texas representative, will serve as district manager, and **Charles A. Hartwell** has been appointed office manager. The territory was formerly part of the southern district with headquarters in Birmingham, Ala.

— o —

J. A. Wilson, Jr., has been appointed assistant chief engineer of the C. A. Norgren Co., Englewood, Colo. Mr. Wilson has been associated with Norgren engineering since 1950, serving as chief draftsman and supervisor of design and drafting.

De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

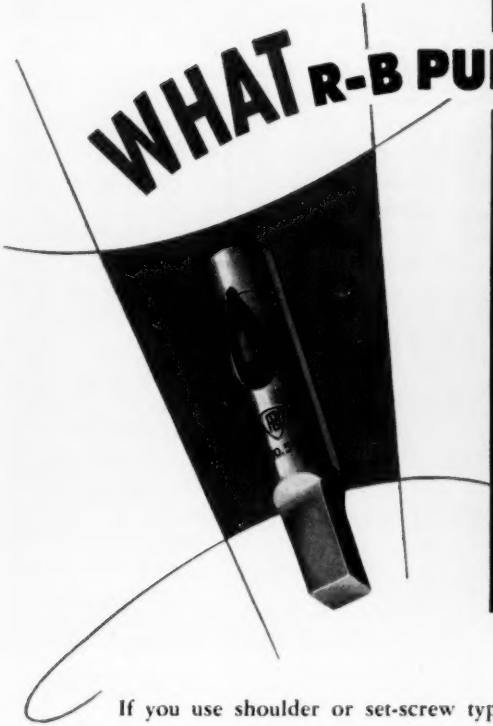
De-Sta-Co clamps are engineered for rugged use in production; reamed bearing holes insure precision fit, long life and sensitive operation . . . offsets in handles and links relieve friction . . . made with cold drawn bars, and forged portable clamp parts. Accessories for adapting clamps to specific applications are available.

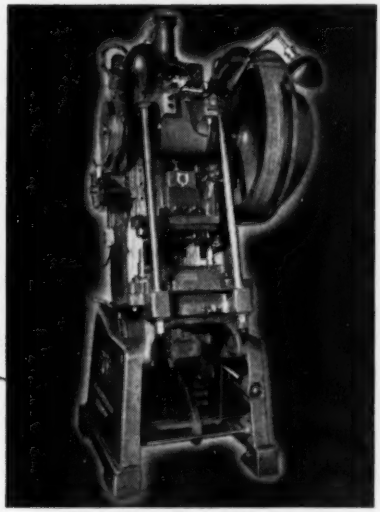
Write today for name of nearest distributor and your copy of the De-Sta-Co catalog which describes over 40 fixture and portable models with positive holding pressures up to 4000 pounds.

DESTACO **DETROIT STAMPING COMPANY**

349 MIDLAND AVE. • DETROIT 3, MICH.

WHAT R-B PUNCHES SAVE...





What does this press cost you per hour?

If you use shoulder or set-screw type punches, you have excessive press down-time when replacing worn or broken punches.

But, with R-B interchangeable and standardized punches and die buttons you get quick insertion and removal in the press. The R-B ball lock features, that assure positive radial alignment and vertical locking without further keying, permit greater press utilization.

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
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ADDRESS _____

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OTHER ALLIED PLANTS

SPECIAL COLD FORGED PARTS

STANDARD CAP SCREWS

PRECISION GROUND PARTS

SHEET METAL DIES
MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

Metal-Working News in Brief

Utica Drop Forge & Tool Corp., Utica, N. Y., has announced the appointment of **D. James Murray Co.,** 308 Ninth Ave., N., Seattle 9, Wash., as sales representative in Washington and Oregon, in cooperation with **Gardner Distributing Company** which will stock the complete line of Utica pliers, wrenches, and screw drivers.

Norton Co., Worcester, Mass., has announced the appointment of **Rodger C. Swift** as an abrasive engineer in the central Illinois territory. Mr. Swift was formerly assigned to the company's South American sales territory in Rio de Janiero, Brazil. **John W. McCue,** who formerly covered the central Illinois territory, has been assigned to the Chicago area, succeeding **William N. Jove** who has joined the staff of field engineers at the Chicago office.

—o—

Columbia Tool Steel Co., Chicago Heights, Ill., has announced the appointment of **A. J. Rod Co., Inc.,** 5011 Navigation Blvd., Houston, Texas, as its sales representative in the Texas territory.

—o—

The Buffalo, New York, branch of Thor Power Tool Co., Aurora, Ill., has moved into a new building located at 735 Military Rd., Buffalo. The new office, under the direction of **C. T. Connolloy,** will provide increased facilities for sales and will be equipped with a new, modern tool repair department.

IS THIS THE ADVERTISEMENT YOU ARE LOOKING FOR?
It is if you are in the market for gears because the 20-page illustrated Earle Gear Catalog has information of great value to those who design and purchase gears. Tables give required dimensions for ordering spur, bevel, and worm gears . . . there's a handy formula chart for conversion of various gear elements . . . plus much other helpful data.
For over half a century Earle has been turning out top quality gears. Let this experience go to work for you. Whether you need only a small fibre gear, or a whole train of gears for moving structures as large as a bascule bridge, you will find Earle ready to assist you.
Write today for the free Earle Gear Catalog, or send prints for quotation. THE EARLE GEAR & MACHINE CO., 4707 Stenton Ave., Phila. 44, Pa.
EARLE GEARS
It's good business to do business with EARLE!

here it is

Rodgers new 3 in 1

OPEN YOKE PRESS

Here is an all-around press available in 100, 200, 300 and 400 ton capacities. It incorporates features that could be found only on standard shop and platen presses. Now at the price of one press you can perform the work formerly done by three.

Performs the work of three separate presses!

1—SHOP PRESS

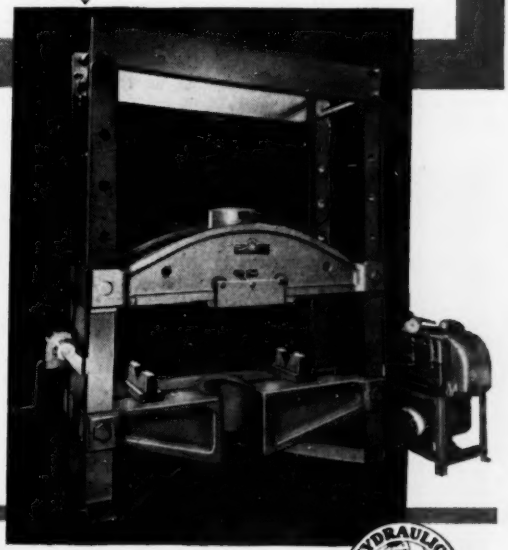
2—FORCING PRESS

3—PLATEN PRESS

Check these outstanding features:

- Yoke member bed machined over entire surface.
- Rugged, machined "V" blocks accurately centered in yoke member groove.
- Wear collar supplied for inserting in yoke recess.
- Bed plate insert covers yoke recess to provide continuous flat working surface.
- Recess takes yoke adapters normally used with Rodgers Forcing Presses.
- Movable cylinder with locking device provides full pressure across entire width of press.
- Clear, open ends permit entrance of long material.
- Choice of Hand Operated or Power Driven Hydraulic Pumps.
- Hand operated winch raises and lowers bolster.

Write for Catalog 313A today!



Rodgers Hydraulic, Inc.

HYDRAULICS Rodgers BUILT THE WORLD OVER

7447 Walker Street, St. Louis Park, Minneapolis 16, Minnesota

new shop equipment

Gear Shaving Machine Handles Gears up to 180-Inch Pitch Diameter

Identified as the Red Wing Model GCK-180, a horizontal gear shaving machine, completed by National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich., is said to handle gears up to 180-inch pitch diameter and, with certain modifications, work gear diameters could be increased to 200 inches. The shaving process is said to reduce errors in tooth profile to a tolerance of 0.0002 inch and index or pitch errors to 0.0003 inch. Designed for horizontal axis shaving with the work gear rotating and located in journal bearings, the machine weighs approximately 115 tons, is 24 feet long x 25 feet wide, and, including a large work gear, rises 18.5 feet above its concrete foundation.

All the principal structural elements of the machine are solid, heavily-ribbed castings. The saddle has a stationary feed screw anchored at both ends, and an accurate journal checking device has been made an integral part of the saddle assembly. The use of twin journals in each of the work-carrying pedestals and twin spindles in the headstock are said to provide a range in work gear sizes from 30 to 180-inch pitch diameter, a ratio of 1 to 6. For cutting herringbone-type gears, two cutter heads are provided, each of which can be carefully set for its side of the herringbone. Three operational control stations, one on each side of the saddle and one at the headstock, are provided to facilitate setup and the control of the op-

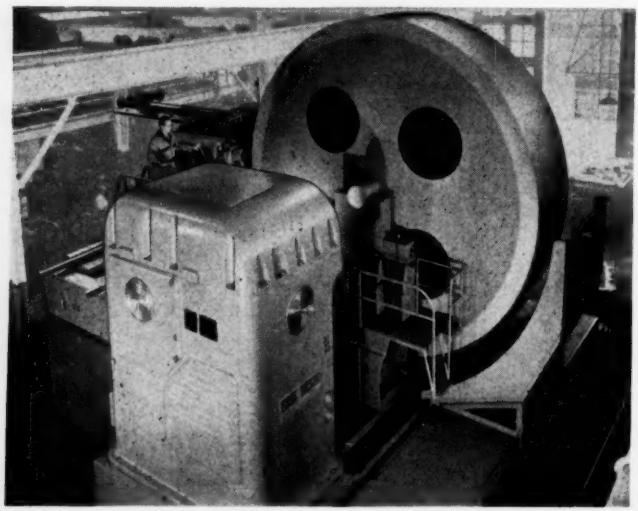
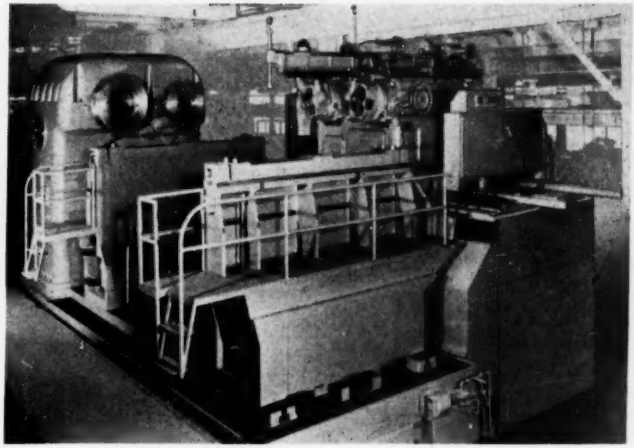


Illustration showing Red Ring Model GCK-180 Horizontal Gear Shaving Machine for gears 30 inches to 15 feet in diameter, with dummy gear in shaving position



View of Red Ring Model GCK-180 Horizontal Gear Shaving Machine, showing headstock with dual work spindles at the left, pedestals in the foreground, and saddle assembly with two cutter heads and journal checker in the rear

erating cycle. Power traverse is provided for the saddle and pedestals, the pedestals having operator platforms and easy adjustments for accurate alignment of the work gear.

The base consists of two parts rigidly locked together with trussed spacers. The front portion of the base carries the stationary work-drive headstock and two adjustable pedestals, and the rear part carries the saddle assembly, including cutter head slides and journal checker, which may be power positioned at will within its 137-inch traverse range. The headstock is a heavy, rigid, one-piece casting which is equipped with two spindles 40 inches between centers. The front or larger spindle is used for the larger work gears, with the rear spindle being used for the smaller units. The headstock has its own 25-h.p. drive motor.

The saddle, operating on hardened and ground ways, is a self-contained unit equipped with its own two-speed reversing drive motor and is traversed in both directions under push-button control. The cutter head assembly includes two cutter slides with a journal alignment checker between them. Each cutter slide is provided with power traverse to bring it quickly into approximate shaving position with the work gear. Both cutter heads have precision anti-friction spindles. The crossed axes setting of each cutter head is made by a sensitive adjustment crank and vernier scale.

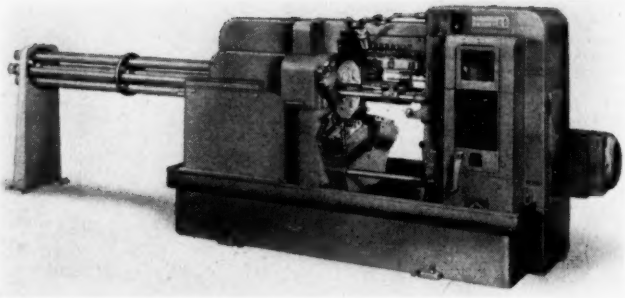
Shielded-Arc Electrode

Designated as "Fleetweld 51," a mild steel E-6010 shielded-arc electrode which is designed for all-position welding with direct current has been placed on the market by The Lincoln Electric Co., Cleveland 17, Ohio. According to the manufacturer, Fleetweld 51 is well suited for welding of all types of joints in the overhead or vertical position, producing flat-faced fillets when welded in a vertical position and minimizing sagging or excessive convexity on welds made in any position.

The electrode, it is claimed, may also be used for welding galvanized, dirty, or rusty plate; welding pipe in all positions with "vertical up" techniques; applications requiring maximum penetration; and applications requiring physical properties of an E-6010-type electrode. Arc characteristics are said to secure excellent root penetration, and the weld is fast freezing with an unusually small volume of slag. The electrode is available in 14-inch lengths and in $\frac{1}{8}$, $\frac{5}{32}$, and $\frac{3}{16}$-inch diameter sizes.

Automatic Bar Machine Is Available in 1-1/4 and 3/4-Inch Sizes

The Warner & Swasey Co., Cleveland 3, Ohio, has introduced a small automatic bar machine which is available in $1\frac{1}{4}$ and $\frac{3}{4}$-inch sizes and which includes the rapid set-up and precision working features of the company's larger model automatics previously announced. The new machine incorporates the same quadrant mechanism which eliminates changeable cams. Feed strokes are set by positioning trip blocks on calibrated quadrant scales. The same principle is applied to the cross slide feeds. The machine also incorporates elliptical-eccentric gears to power the indexing mechanism for quick, vibra-



Warner & Swasey 1¼-Inch Automatic Bar Machine

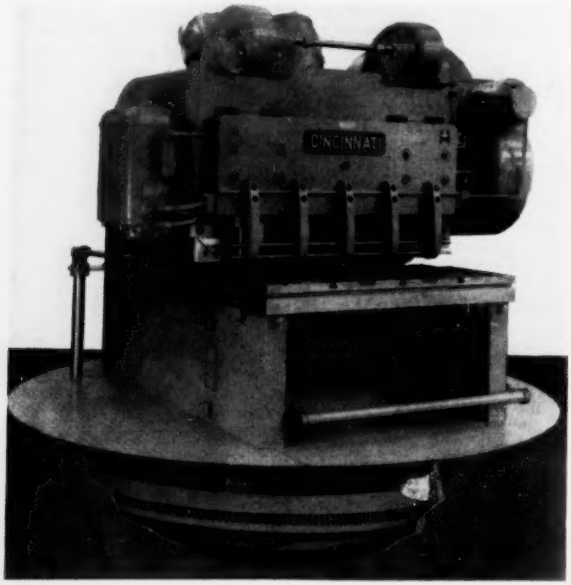
tionless operation. Provision for overindexing of the spindle drum, at which point a latch drops into position and a toggle-operated locking slide back-indexes the drum about $\frac{1}{16}$ inch against the latch, is said to provide smooth, shockless indexing and firm clamping.

The machine is equipped with six spindles, having a speed range of 255 to 2,781 r.p.m. in the 1¼-inch size and 372 to 4,045 r.p.m. in the ¾-inch size. The turning stroke is claimed to be infinitely variable between 0 and 5 inches, and the maximum length turned, with multiple cuts, is 8½ inches standard and up to 10 inches special. The bar feed stroke is infinitely variable up to 10 inches, and the cross slide stroke is variable between 0 and $\frac{13}{16}$ inch. The machine is powered by a 20-h.p. 1,750-r.p.m. motor with a drive shaft speed of 916 r.p.m. in the 1¼-inch size and 1,333 r.p.m. in the ¾-inch size. The coolant capacity is 120 gallons, and the machine has a free circulation reservoir with a 7-gallon capacity and a lubrication reservoir with a capacity of 6 gallons. The machine measures 11 feet 2 inches long overall.

Shear Is Capable of Cutting Mild Steel up to 1 Inch Thick

An all-steel shear which is said to be capable of cutting mild steel up to 1 inch thick and 4 feet long has been announced by The Cincinnati Shaper Co., Cincinnati 25, Ohio. The shear is mounted on a turntable which is rotated by means of a circular rack and pinion. The machine can be set at different positions to eliminate as much handling of large plates and coiled stock as possible and can be turned 90 degrees either side of the center.

The all-steel shear weighs 42,000 lb. and operates at 30 strokes per minute. The machine is equipped with a hinged back-gage angle that permits the cutting of plates longer than the back gage range. Additional features include a light beam shearing gage, ball transfers in the table, and air counterbalances on the ram.



Cincinnati All-Steel Shear

To SHELDON CHICAGO U.S.A. Lathe Owners

For All Sheldon Lathes less than 5 Years old...we have just published a new Parts List Manual, with:

. . . . every lathe part and sub-assembly illustrated, named, numbered and positioned on explanatory exploded drawings.

. . . . a section which illustrates and describes each of over 50 modern Attachments and Accessories to make your Sheldon Lathe even more versatile, productive and valuable to you.

To get this valuable Parts List (and Accessory) Manual just write (1) the serial number of your Sheldon Lathe and (2) your name, and (3) your firm name and address, on a post card, letterhead, billhead or slip of paper and mail it to "Parts Manual".

SHELDON MACHINE CO., INC.
4250 North Knox Ave., Chicago 41, Illinois

Buy safe "SHUR-GRIP"

drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes re-molding easier, quicker, surer, less expensive.

COMPLETE LEAD HAMMER SERVICE

Write for circular and prices

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67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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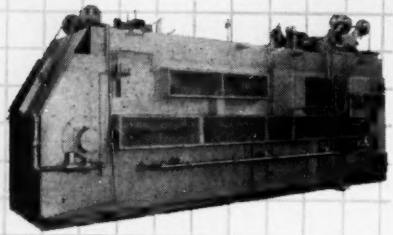
no other organization in the world covers the field so completely



CONVEYOR HYDRYZING HARDENING FURNACES

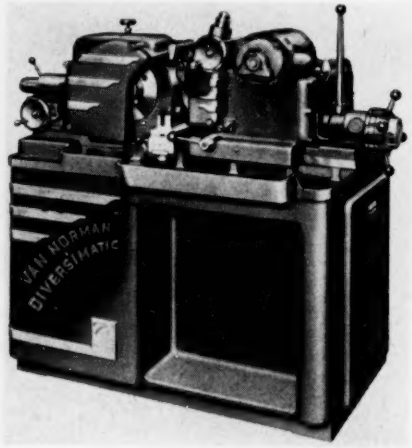
LINDBERG

ENGINEERING COMPANY

2450 W. HUBBARD ST. • CHICAGO 12, ILL.

Centerless Grinder Features Easily-Removable Grinding Wheel

The Van Norman Co., Springfield 7, Mass., has announced the addition of the Diversimatic Centerless Grinder to its line of oscillating radius grinders and production cylindrical grinders. The machine features a special easily-removable grinding wheel and a spindle quill with combined double-row ball and roller bearings which are sealed and lubricated. The spindle, it is claimed, requires no warm-up period. The machine incorporates a combination straight and contour grinding wheel dresser and a straight screw-type regulating wheel dresser. The grinding wheel diamond is constantly



Van Norman "Diversimatic" Centerless Grinder

flushed from below with coolant during wheel dressing. The machine has a ¼-h.p. regulating wheel drive which is infinitely variable from 30 to 300 r.p.m. and a large 1⅞-inch 4-thread Acme infeed screw with a full-length split-type nut to compensate for wear.

According to the manufacturer, of special importance is the crush forming attachment which provides efficient means of grinding small formed parts to high precision. The attachment, it is claimed, dresses the wheel face to the desired contour imparting the exact profile to the workpiece. The machine has a wheel clearance of from 0 to 1½ inches and a grinding wheel speed of 1,600 revolutions per minute.

DEPT. OF DEFENSE work . . . by *LINDBERG* Induction Heating Units

L. A. Young Spring & Wire Corp., Detroit, Mich., use two 5 KW Lindberg Induction Heating Units for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting requirements.

We can't tell you much about the manufacturing processes at the L. A. Young plant (due to security restrictions) . . . but we can tell you about the many rugged construction features of this equipment . . . features which make it so dependable that the L. A. Young organization selected Lindberg Induction Heating Units for their important Department of Defense work. These points of design and construction will minimize costly breakdowns and aggravating work stoppages:

Filament voltage regulation transformers keep tube filament voltages at proper values regardless of line fluctuations. The end result . . . longer tube life.

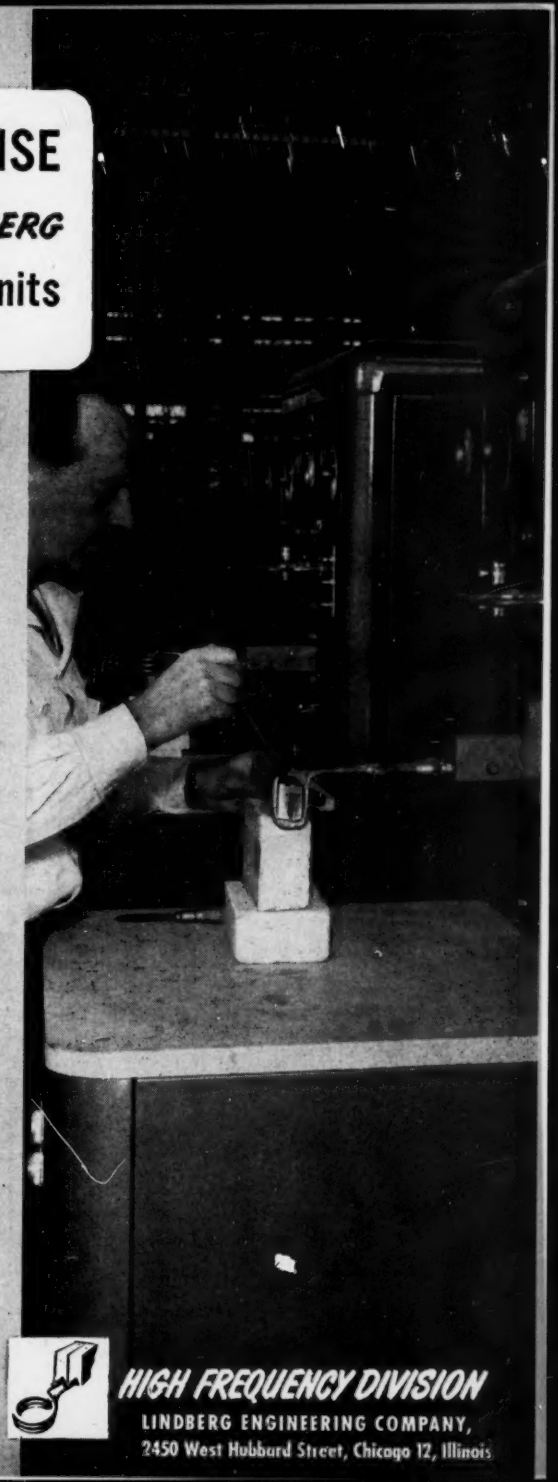
Checklites . . . A system of indicating lamps instantly reveals any abnormal operating conditions . . . simplifies servicing.

Work coil burn-out protection . . . An electrical interlock system makes it impossible to turn on power when cooling water is not flowing.

Long-life industrial tubes feature shortened internal structure . . . Kovar metal-to-glass Seals . . . heavy walled anodes.

Sealed tank capacitors are hermetically sealed against dirt and dust . . . require no servicing or refilling.

Investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.



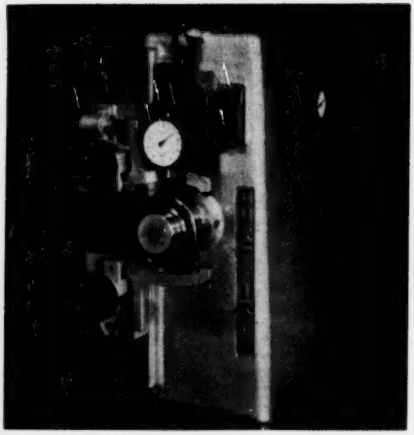
LINDBERG

HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2450 West Hubbard Street, Chicago 12, Illinois

Instrument Is Designed for Measuring Radial Play in Ball Bearings

A pivotal-arm type radial internal-clearance measuring instrument which is said to make possible easy, fast, and accurate measuring of the radial play in ball bearings has been announced by The Sheffield Corp., Dayton 1, Ohio. The instrument, it is claimed, may be used to accurately measure radial play on a production basis, as well as inspect incoming shipments or set up control over radial play before bearings are assembled with their components. The instrument features two easily-adjustable air-operated pivotal-load bearing arms which alternately exert upward and downward pressure on the bearing. At the same time, the unit measures the successive movements of the outer ring to determine radial play of bearing in that position.



Sheffield Radial Internal-Clearance Measuring Instrument

Other features of the instrument include an automatic shakedown of the balls into the bottom of the groove; direct readings without the use of masters; single three-station foot-pedal control of load bearing arms; easily-changed arbors that correspond to the internal diameter of the bearing's inner ring; and the company's Guidegage to facilitate slipping the bearing on and off the arbor. Two standard models are available, one for bearings with an outer diameter of from 18 to 90 mm. and the other for accommodating an outer diameter from 90 to 180 mm.

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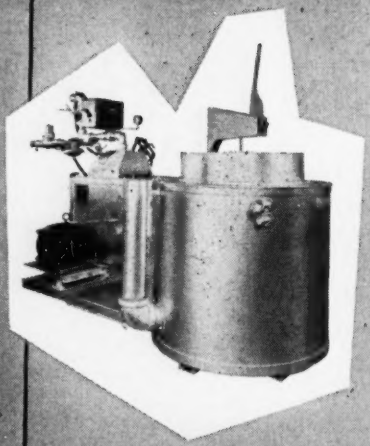


BATCH TYPE CYCLONE TEMPERING FURNACES

LINDBERG ENGINEERING COMPANY

2450 W. HUBBARD ST. • CHICAGO 12, ILL.

READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.

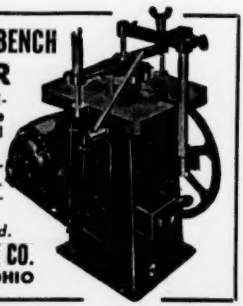
3¾" stroke; adaptable for other work.

Low first cost — prompt delivery.

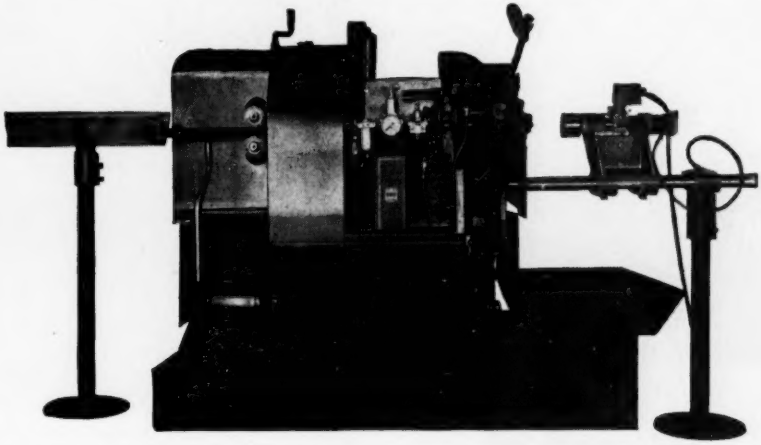
Good dealers wanted.

READING MACHINE CO.

CINCINNATI 37, OHIO



The NEW MODERN AUTOMATIC
CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off *any length you want*—and cuts it *faster.* If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

½" Tubing

This machine cuts off and chamfers both outside edges of ½" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1¼" Cold Rolled

This machine cuts off and chamfers both ends of 1¼" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in four sizes, handling work up to 6¾" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

4" Threaded Studs

Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. (¾" U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

WRITE FOR ILLUSTRATED CATALOG.

MODERN MACHINE TOOL CO.

Jackson, Michigan

Sheet Metal Fabricator Is Designed for Punching, Notching, and Nibbling

Designated as the Wales Model 10-C, a heavy-duty sheet metal fabricator which is designed for punching, notching, and nibbling operations has been announced by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y. The fabricator has a 27-inch throat depth with a back gage installed and a 30½-inch throat depth without a back gage. The punch assembly holder arm swings to the right for quick interchangeability of punches. The punches and dies are automatically aligned by the holder which permits holes

Wales Model 10-C Sheet Metal Fabricator in use

to be punched up to 3½ inches in diameter. The machine incorporates a 56 x 37-inch work table, providing level support of large workpieces and permitting convenient left to right feeding and stacking for small workpieces.

The machine utilizes the "Hydra-New-Matic" head which is said to operate with a minimum of vibration and noise at 165 strokes per minute. Full-floating drive shaft construction, it is claimed, places the ram load, by means of main bearings, directly on the frame proper, minimizing bending stress on the drive shaft. A drawer-type cabinet on each side of the fabricator base provides convenient storage space for punches, dies, and other equipment. A built-in counter placed at eye level automatically totals the strokes of the ram. An adjustable foot trip mechanism permits the operator to use both hands in handling large sheets.

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LABORATORY HIGH FREQUENCY COMBUSTION EQUIPMENT

LINDBERG

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2450 W. HUBBARD ST. • CHICAGO 12, ILL.

M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO.

120 PHILADELPHIA ST. HANOVER, PA.

EXTRA delivery
EXTRA men
EXTRA service
at no extra cost . . .
YOUR B-RIGHT-ON
SOCKET SCREW
DEALER
Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.
EXTRA INVENTORY—When you need socket screws, he has them or will get them quickly from centrally located factory stocks.
EXTRA SERVICE—When you need technical help on fasteners, he has at his disposal factory engineers, Brighton's field men, to help you.
EXTRA QUALITY—His line of Brighton Socket Screws is tops in quality, meeting the highest standards of strength, accuracy and uniformity.
Take advantage of all the EXTRAS your Brighton distributor offers. If you are not already acquainted, write for his name.
B-RIGHT-ON
THE BRIGHTON SCREW & MANUFACTURING COMPANY
Reading Road at Dorchester, Cincinnati 2, Ohio

Machine Tool Locating Microscope Provides 30X Magnification

Designated as the Model 11, a machine tool locating microscope which provides 30X magnification, great enough to see 0.0001 inch, has been announced by The Perkin - Elmer Corp., Norwalk, Conn. When attached to a machine tool, such as a jig borer or a vertical milling machine, the microscope is said to aid the machinist in checking contours, slots, and surface conditions which cannot be accurately checked by mechanical measuring instruments. Designed for mounting directly in the machine spindle or on an offset bracket, the locating microscope incorporates a roof prism in its optical system to erect the image, thus making all table movements appear to be in the true direction when observed through the eyepiece.

Perkin-Elmer Model 11 Machine Tool Locating Microscope installed on a jig borer

The instrument, it is claimed, has a wide field of vision that includes a full ¼ inch of the workpiece, thus simplifying picking up a reference point and enabling the operator to visualize the relationship of various contours of the parts. The focusing eyepiece is set at a convenient angle from the optical axis for ease of viewing. In precision grinding or boring, the microscope is capable of checking the trueness of rotation of the part to be ground or bored before the operation starts. The instrument can also be used for machining parts from template layouts without destroying the template.

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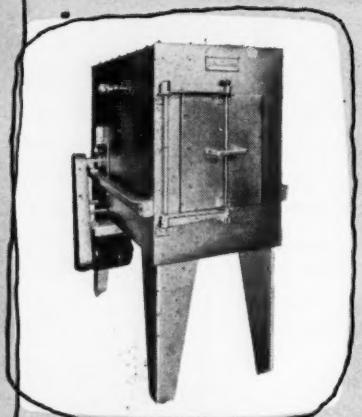

TOOLROOM CYCLONE TEMPERING FURNACES

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CUT TOOL COSTS

broken tools made like new again with NU-TANGS*

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6) Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

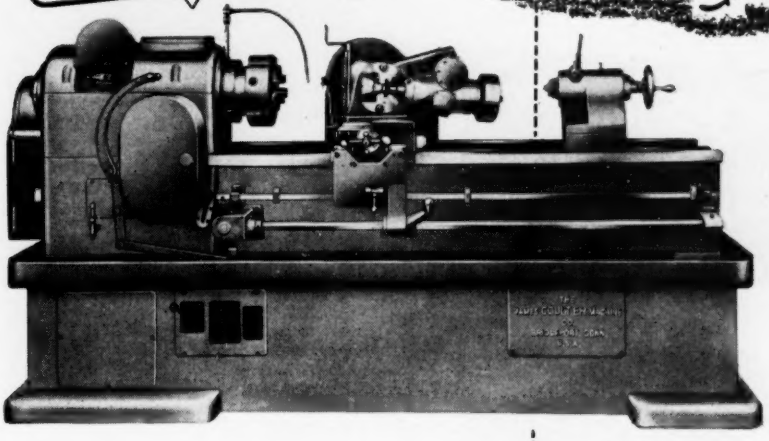
NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!
GUARANTEED STRONG AS NEW!

Send them to us like this! We return them like this!

NU-TANGS INC. 1339 Bates Avenue Cincinnati 25, Ohio

FASTER AUTOMATIC PRECISION THREADING

The only answer to high cost production blues!



Get set to sing a happy tune, for **COULTER** can help you banish those *"labor shortage/reject/poor production of threaded part/blues"*.

The **COULTER** "Threadmaster" (shown above) is one thread milling machine that can produce long and short precision traversing, elevating, crossfeed and lead screws in less time with uncanny accuracy.

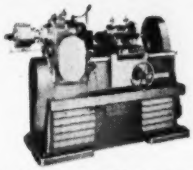
Investigate **COULTER AUTOMATIC THREADING MACHINES** today — change the "blues" to "cheers" — extract *every cent of profit* possible out of your plant and still maintain the high quality standards you demand.

IF YOU ARE CONFRONTED with a thread production problem, our engineers can help you. Literature available.

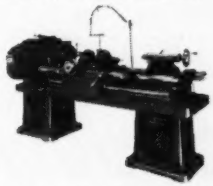
MACHINE TOOL BUILDERS SINCE 1896

The James Coulter Machine Co.

641 Railroad Ave. **Bridgeport 5, Conn.**



Model "H1" COULTER HOB THREADING MACHINE produces internal, external, right and left hand threads with precision — Faster — Accurately — AUTOMATICALLY.



Model "L1" COULTER THREADING LATHE produces precision, square, standard and 29 degree internal or external threads in various diameters and materials — Faster — Accurately — AUTOMATICALLY.

Low-Temperature Chilling Machine Designed for Cold Testing

A low temperature chilling machine which is said to be designed especially for cold testing has been announced by Sub-Zero Products Co., 3930-S3, Reading Rd., Cincinnati 29, Ohio. Instrumentation is provided as needed with either indicating or recording thermometers, and temperature control is adjustable from plus 25 deg. F. to minus 125 deg. F. The control knob is located inside the instrument cabinet to prevent unauthorized tampering. The unit features all-steel construction and, to facilitate the handling of metal parts, the chilling chamber has special heavy-gauge steel walls. Standard

Sub-Zero Test Chamber

motors, controls, and components are used throughout for ease of operation and maintenance.

The unit is available in sizes from 1.5 to 4 cubic feet and in a temperature range from minus 10 to minus 120 deg. F. Various optional features are available to meet specific testing requirements.

T-Nut Is Available in 15 Sizes

A T-nut which is available in 15 sizes to fit practically every machine tool application has been announced by Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio. According to the manufacturer, the T-nut can be supplied with throat sizes ranging from $\frac{7}{16}$ to $1\frac{1}{8}$ inches

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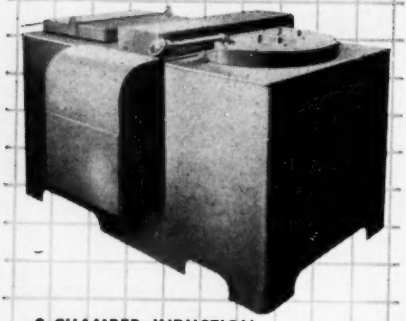

2-CHAMBER INDUCTION MELTING FURNACES

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ENGINEERING COMPANY

2450 W. HUBBARD ST. • CHICAGO 12, ILL.

JIG BORING

Done to your specifications

WE HAVE

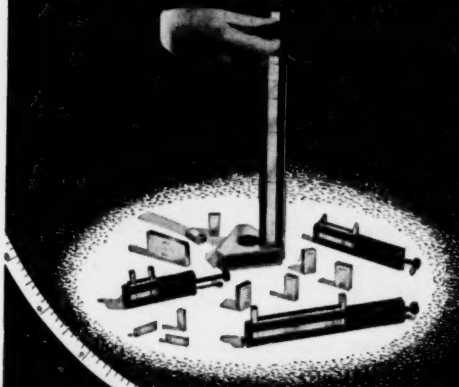
12 JIG BORERS

Including the largest PRATT & WHITNEY Made

BLOOMFIELD TOOL CORPORATION

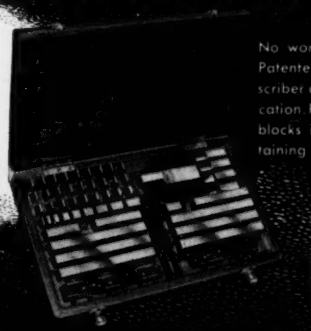
37 FARRAND ST. BLOOMFIELD, N. J.

Standard Webber Accessories
for Dimensions under 12"



WEBBER Standard Accessories are designed for use with standard Webber Gage Blocks and are recommended for measurement under 12". Gage block holders, jaws, center point, scriber and base can be combined into a variety of small gages for precision layout and inspection.

Heavy Duty Blocks and Accessories for Dimensions over 12"



No workpiece too large, infinite range. Patented clamps, jaws, center point, scriber and base offer wide gaging application. Patented eccentric clamp squeezes blocks in opposite directions thus maintaining ±.000005" over entire buildup.

Webber
GAGE BLOCKS
and ACCESSORIES

WEBBER GAGE COMPANY
12899 Triskett Road • Cleveland 11, Ohio

Largest exclusive manufacturer of precision gage blocks

DRILL and PILOT BUSHINGS
Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.
Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

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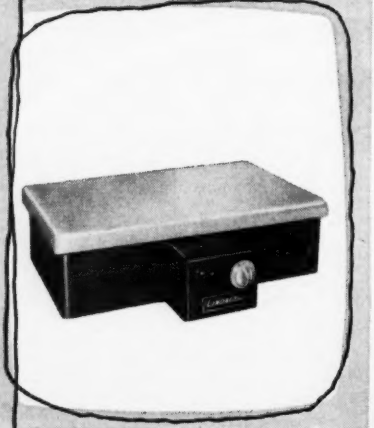

LABORATORY HOT PLATES

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ENGINEERING COMPANY
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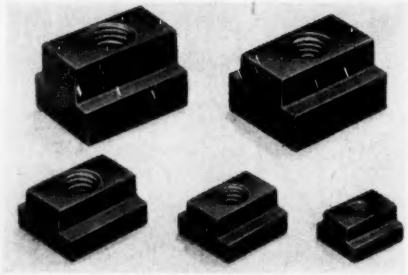


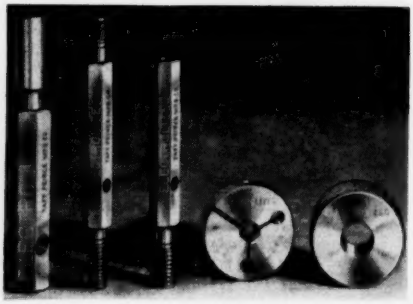
Jegrens T-Nuts

for applications such as table slots and automatic cross slides on milling machines, automatics, turret lathes, brakes, punch presses, shears, planers, and so on. The T-nut, it is claimed, is accurately machined of heat-treated alloy steel with 200,000 p.s.i. tensile strength.

Electrolized Gage Features Long Life

The Taft-Peirce Mfg. Co., Woonsocket, R. I., has announced an electrolized gage which features long life due to an even film of hard non-magnetic alloy which is applied to all gaging surfaces during the electrolizing process. The coating, it is claimed, is 0.000025 inch thick and imparts a tough surface, resulting in long accurate gaging life before reaching wear tolerance limits. According to the manufacturer, the surfaces of the electrolized gage are smooth to reduce friction and possess a high degree of resistance to corrosion. The gaging surface, it is claimed, will not chip, peel, or spall under

Taft-Peirce Electrolized Gages



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POWER PRESSES

Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

***49th** year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.

190 VANDERPOOL ST. NEWARK 5, N. J.

The
LINLEY JIG BORER

Put your small jig boring jobs on this precision machine . . .

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.
Table movement: 6" x 10"; table size, 7" x 17½".

Send TODAY for complete information.

LINLEY BROTHERS CO.

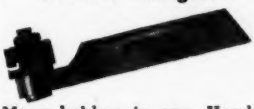
661 STATE ST. EXT., BRIDGEPORT 1, CONN.

WALTON TOOLS
TIME AND LABOR SAVERS FOR MACHINE SHOPS AND INDUSTRY

WALTON TAP EXTRACTORS
Cut costs of Removing Broken Taps

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads. In 2, 3 and 4 flute styles—sizes No. 4 to 1½".

WALTON-AMERICAN TOOL HOLDERS
Save Time and Labor on Tool Changes.



Many holders in one. Head will swivel around an entire circle. May be set for straight, right or left hand offset positions. Will hold with perfect grip any size square or round tool bit or boring bar from ⅛" to 7/16".

"*REPS" PIPE & STUD EXTRACTORS
Reduce Labor Costs for Removing Pipes, Studs and Screws.

For removing broken pipes or studs that defy movement. "Reps" makes a strong four point grip without hammering or pounding. Hardened steel. Pulls rather than reams. In sizes, for every pipe from ⅛" to 2", every stud and screw from ⅜" to 3½".

(*Reps. Tool Company, Inc., a Walton affiliate.)

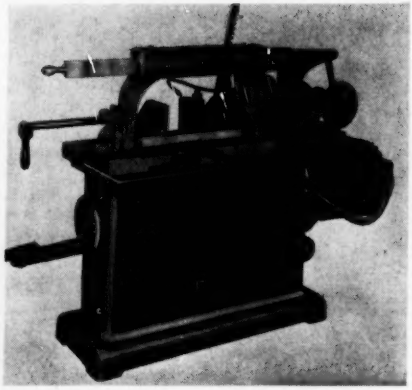
Sold by leading dealers, or write direct for catalog No. 10 of Walton Tools and details of 30 day free trial offer.

THE WALTON COMPANY, Hartford 10, Conn.

normal gaging conditions. The electrolizing process can be applied to Taft-Peirce standard or special gages, as well as to CompAIRator air gage members.

Power Hack Saw Has Capacity of 7 x 7 Inches

Sales Service Machine Tool Co., 2355 University Ave., St. Paul 4, Minn., has announced the Keller No. 4 Hy-Duty Power Hack Saw which has a capacity of up to 7 x 7 inches. The machine incorporates a quick-acting swivel-base vice that operates to a 45-degree angle and has a capacity of 4 x 7 inches at 45 degrees. According to the manufacturer, a variable power pressure regulator provides blade pressure from 0 to 200 lb., and an adjustable foot lift helps hold the saw frame in position while loading and unloading the saw, thus enabling the operator to use both hands for setting and starting the machine.



Keller No. 4 Hy-Duty Power Hack Saw

The machine has an automatic lift on the reverse stroke, adjustable bronze bearings for the guide bar in the saw frame, and a built-in coolant tank and pump. The saw is equipped with Oilite bearings throughout. The machine, it is claimed, has two speeds of 80 to 140 strokes per minute which are obtained by shifting belts. Standard equipment includes an automatic stop switch and an automatic belt take-up device. The saw is said to require a floor space of 17 x 51 inches.

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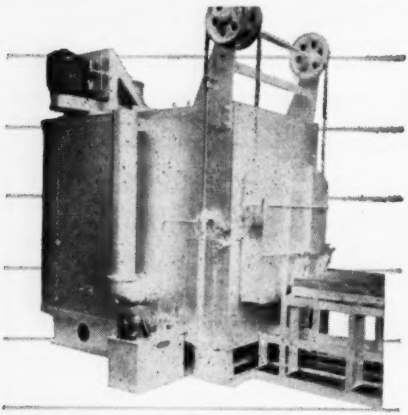

PRODUCTION CYCLONE TEMPERING FURNACES

LINDBERG

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2450 W. HUBBARD ST. • CHICAGO 12, ILL.

A Real Spring Winder!

Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire $1.50
No. 2 Capacity 0 thru 3/16" wire $3.00
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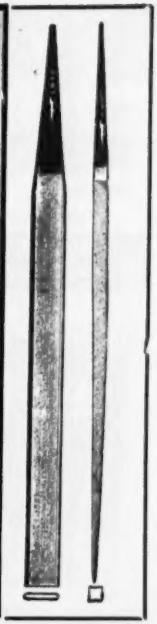

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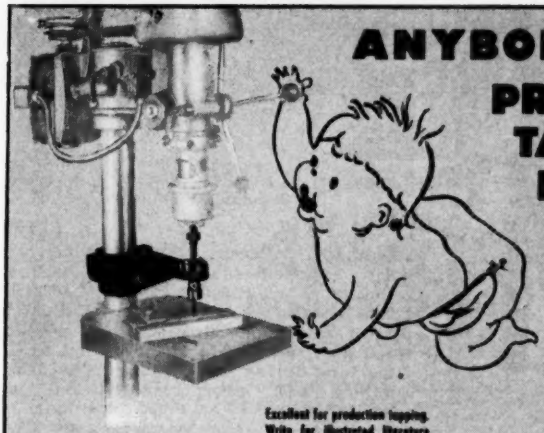

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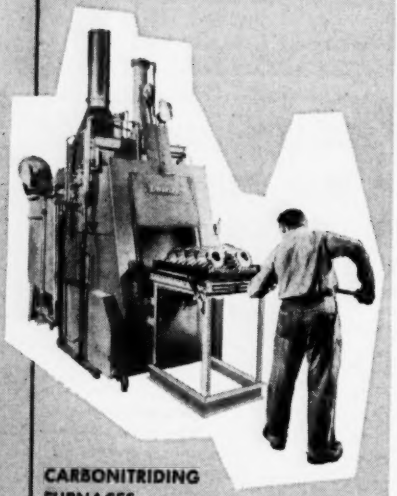

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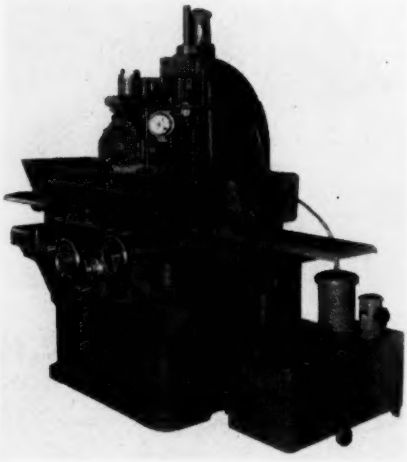
2450 W. HUBBARD ST. • CHICAGO 12, ILL.

Machine Grinds Workpieces Repeatedly to within 0.0002 Inch of Required Size

The Pellow Machine Co., 13500 Foley Ave., Detroit 27, Mich., has introduced the Magerle Tool and Production Surface Grinding Machine which, it is claimed, will complete repeated loadings of the chuck automatically to within 0.0002 inch of the required size. The automatic feature of head feed is controlled by an independent electrical circuit, using a solenoid to operate the feeding mechanism. The automatic feed operates on each



Magerle Tool and Production Surface Grinding Machine

longitudinal reversal of the table or, when required for automatic plunge grinding, on each second reversal of the table. A work measuring device equipped with a 3-inch indicator is said to reveal work size relative to the required final dimension during the grinding cycle. The machine also incorporates a built-in wheel dresser.

According to the manufacturer, the table motions are hydraulically powered, longitudinally variable from 10 to 100 feet per minute, and subject to feeds of the cross slide of $\frac{1}{32}$ to $\frac{1}{2}$ inch. Rapid travel is provided for the head in both directions, as well as for the cross slide. The machine is available in three sizes with 2, 3, and 4-foot longitudinal table travel, respectively. Each model affords a trans-

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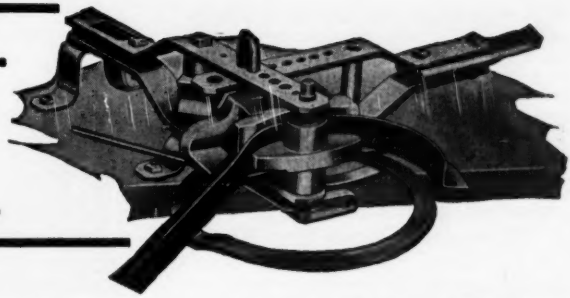
bends 2" x 2" x 3/16"
Angle Iron
EASILY...



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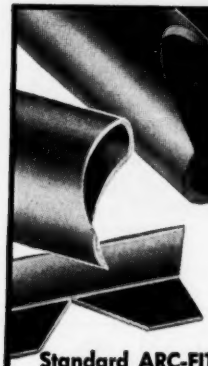

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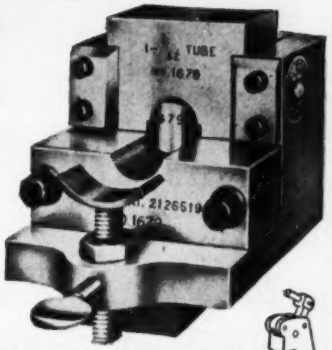

Standard ARC-FIT in hand or power press shears contours for "T" joints for ½" to 2" pipe or tubing with easily interchanged dies. Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

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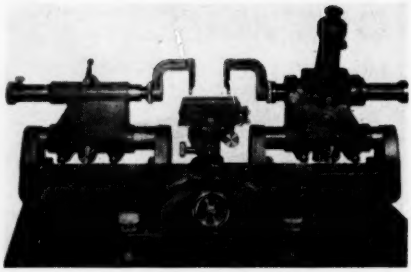
Send for descriptive literature

Standard Arc-Fit works well in our special HAND PRESS

verse table travel of 10⅝ inches. The maximum clearance between the wheel and the table is 15¾ inches. Separate motors and controls are provided for each function. The machine utilizes a grinding wheel 11½ inches in diameter x 1¼ inches wide.

Instrument Measures Plain and Threaded Gages and Parts

The Microptic Measuring Machine (horizontal type), which, it is claimed, provides a means of measuring lengths



Microptic Measuring Machine

or diameters of gages and parts to 0.00005-inch direct reading and 0.00001 inch by convenient estimation through the use of a built-in 4-inch glass scale, is available from Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. With simple standards of 4 inches in length, the instrument can be extended to a maximum capacity of 14 inches external measurement and 10 inches internal measurement. The work table is fully adjustable, including provisions for tilt and rotation, thus making is possible to align the workpiece quickly to check true maximum or minimum dimensions.

According to the manufacturer, no gage blocks or other length standards are required with each measurement, the machine being a self-contained unit for rapidly checking gages or pieces of varying size.

Lifting Magnet Is Designed for Continuous Operation

A lifting magnet which is designed for continuous operation has been announced by O. S. Walker Co., Inc., Worcester 6, Mass. According to the manufacturer,

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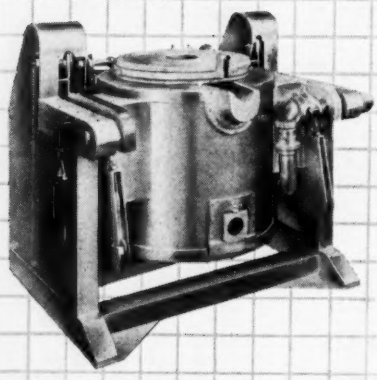

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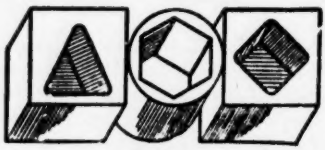

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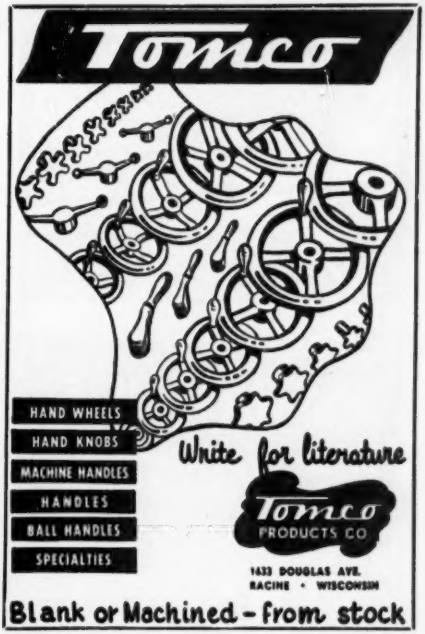

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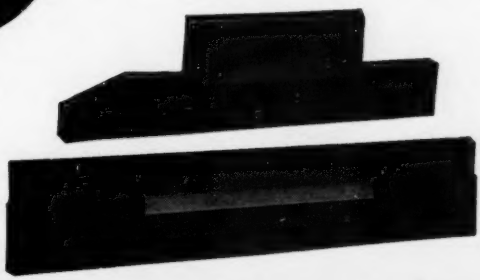
Prompt quotes on receipt of your prints.



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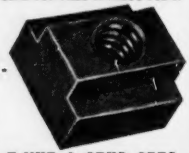

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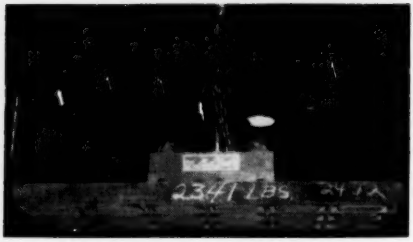


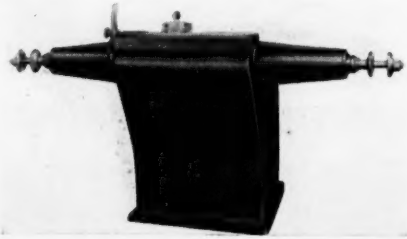
Walker Lifting Magnet in use

the magnet is made of a highly-permeable material, magnetized to complete saturation to provide equal flux distribution. The unit is supplied in flat and contour styles, in either round or square design. Four sizes are available; namely, 12 inches in diameter with a maximum lifting capacity of 5,000 lb.; 24 x 24 inches for lifting 14,000 lb.; 36 x 36 inches to accommodate 25,000 lb.; and 48 x 48 inches with a capacity of 48,000 pounds.

Polishing and Buffing Lathe Has Extended Spindle for Maximum Working Area

Designated as the Model 10 VROW, a variable-speed 10-h.p. polishing and buffing lathe which features an extended spindle to provide maximum working area has been announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54F, Mich. Designed for heavy polishing and buffing operations, the lathe is said to have a variable spindle speed range of from 1,500 to 3,000 r.p.m. According to the manufacturer, the speed of the lathe can be changed instantly while the lathe is running simply by turning a dial control.

Hammond Model 10 VROW Variable-Speed Polishing and Buffing Lathe



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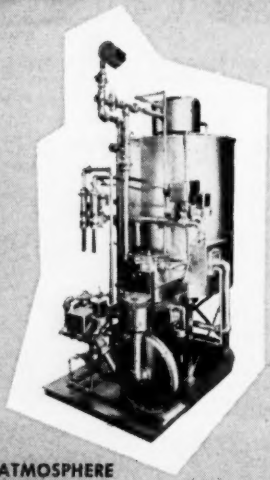

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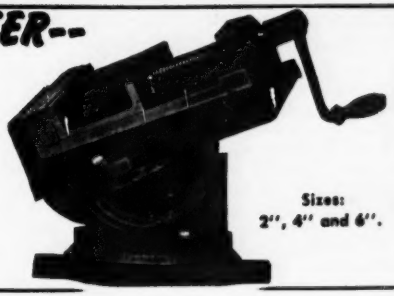

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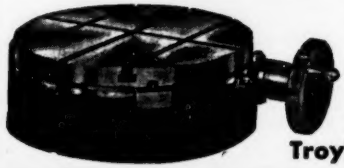
with TROYKE ROTARY TABLES



Sizes:
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See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

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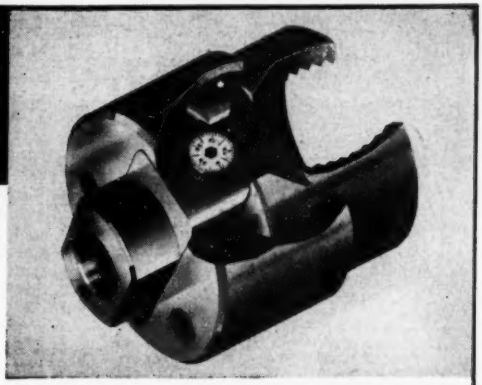
BORING CHUCKS



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Manufacturers of
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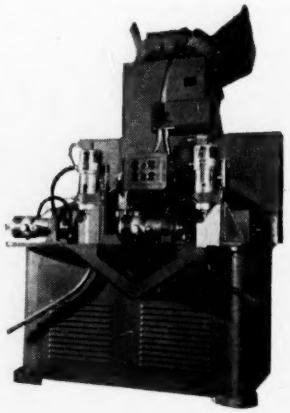
LAST WORD
WHEEL
DRESSER

LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

Drilling and Deburring Machine Features Double Feed

A drilling and deburring machine which features a double feed and operates automatically has been announced by Inter-Lakes Engineering Co., 4845 Bellevue, Detroit 7, Mich. According to the manufacturer, the machine is designed principally for second operations on screw machine parts up to 1 inch in diameter x 2 inches long, drilling holes at any angle desired. The production capacity of the machine is said to be 3,000 pieces per hour, the only attention required being to keep the hopper filled. The double-feed feature, it is claimed, not only makes possible large production at a slow operating speed, but also enables one half of the machine to be serviced while the other half is in operation.



Inter-Lakes Drilling and Deburring Machine

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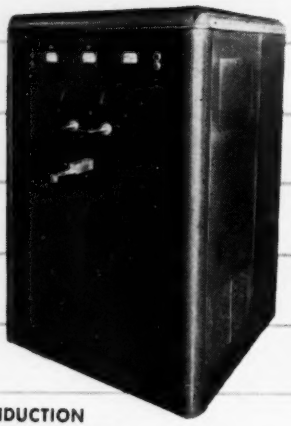

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Chromium-Manganese Steel

An austenitic alternate for 18-8 stainless that affords good cold working properties, good weldability, and good ductility has been developed by Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa. Produced with manganese, chromium, and less than one per cent nickel as principal alloying elements, the steel is said to offer promise of widespread usefulness and is available in strip form, as well as in most other forms. Chromium-manganese steels are particularly recommended for appli-

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Has 2 contacts 1/32" threaded within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts—

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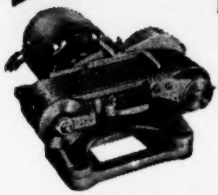

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

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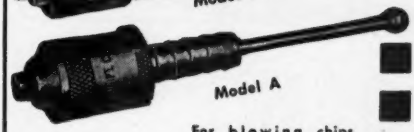

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HARDENED and GROUND HSS BLANKS
Any decimal diameter to 5/8" — in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
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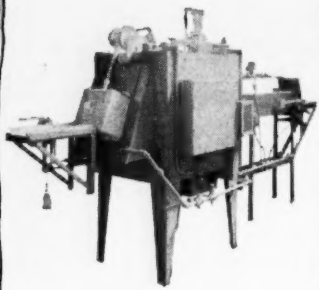
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BRAZING FURNACES
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cations where critical requirements include the mechanical properties of welds, ductility, non-magnetic qualities, and cold working to high strength.

Flexible Grinding Wheel Consists of Hundreds of Individual Abrasive Cloth Leaves

Designed for light grinding and metal finishing operations, a flexible grinding wheel, designated as the "Grind-O-Flex," which consists of hundreds of individual abrasive cloth leaves sealed to a hard core has been introduced by Merit Products, Inc., 4023 Irving Place, Culver City,

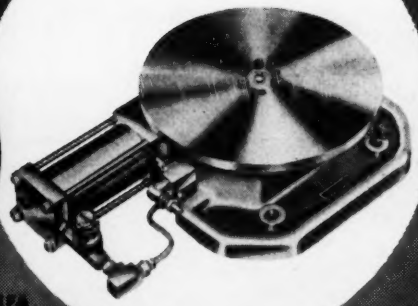
(Top) Merit "Grind-O-Flex" Grinding Wheel in use. (Bottom) Exploded view of Merit "Grind-O-Flex" Grinding Wheel

Calif. According to the manufacturer, the wheel presents a continuous abrasive surface to metal parts while it is rotating, thus making it ideal for smoothing surfaces and removing flaws from contours. The wheel measures 6½ inches in diameter x 1 inch wide and is available in a variety of grits from coarse to very fine.

A mounting arbor is provided for attaching the wheel to any standard plain or threaded shaft or for chucking in ¼ or ½-inch chucks. Flanges, which are held securely in place against the wheel by a single nut, are also provided. The wheel weighs 8 oz., and a 1/6-h.p. motor is said to be sufficient for operation.

NEW

ALLEN DIAL FEED TABLES



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MODEL 11FA AND MODEL 11FB

- Top Plate Guaranteed Against Over-ride.
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- Hydraulic Check Available for Extra Smooth Operation.
- Adjustable from 4 to 24 Index.
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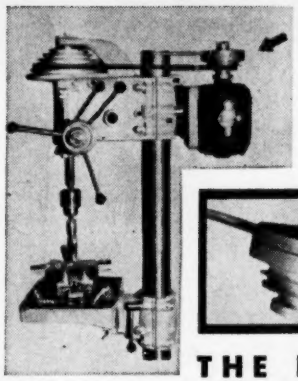
SPEED-REDUCING PULLEY

Increases Drill Press Capacity

NEW MODEL

Provides Correct Speed and Power to Drill Up to 1 3/8" with 1/2 H.P. Motor



Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx. 45 to 2000 RPM. Made in 3 motor shaft sizes: 1/2", 5/8", 3/4". Write for literature.

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4118 E. 8-Mile Rd. • Detroit 34, Michigan

WRITE FOR LITERATURE

"Cleveland" Hydraulic Knife Grinder

Machine Grinds Straight and Concave Bevels of Any Angle

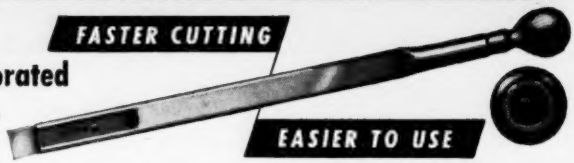
Designated as the "Cleveland," a hydraulic knife grinder which is designed to grind straight and concave bevels of any desired angle or straight flat surfaces has been announced by The Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio. Said to be ideal for sharpening high-alloy machine knives, the grinder incorporates a wheel head which can be tilted from the vertical position; therefore, the plane of the grinding wheel is at an angle to the workpiece being beveled. According to the manufacturer, hydraulic cross feed is provided for the vertical wheel head at instantly variable speeds as the 18-inch diameter segmental grinding wheel travels across the workpiece horizontally. The hydraulic cross feed is said to permit the grinding wheel to feed into and across the work without actually moving the head down.

The grinder has a working surface measuring 12 inches wide x 60 to 240 inches long. A large-capacity coolant system is provided for wet grinding, including a motor-driven pump, piping, and an ample-size storage tank with baffle plates for filtration. Standard equipment

NEW IMPROVED HAND SCRAPERS

with just the correct spring

and other features never before incorporated in any hand scraper



This new Hand Scraper, Model No. 5, is the most improved tool of its kind ever produced. Light in weight, easier to use with palm fitting comfort grip, faster cutting.
Rubber handle swivel pad, at small extra cost, for those who place scraper handle against body for extra leverage. Three sizes: 18"—20"—22" long. Furnished with high speed steel or Carboloy Blades. Cost less than home made scrapers.

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ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

25,000,000 of these parts have been marked automatically on screw machines

NEW METHOD *Automatic* ROLL MARKER

Designed for use on automatic screw-machines, lathes, etc., the New Method Model 500-C marker with its quick-interchangeable roll dies is practically fool-proof, saves time and money.

Eliminates Separate Marking Operation

For further information ask for Bulletin NM 500-C.

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit 7, U.S.A.

MARK IRON, STEEL and CARBIDES

THE Etchograph WAY

Original Electric Etcher, Thousands in Daily Use

Mark *hardened parts*, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

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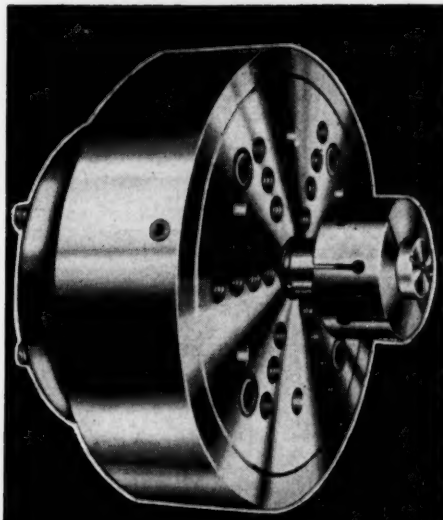
P. O. Box 191 Tenafly, N. J.



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3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
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Speedgrip Precision Internal Chucks will save you money on second operation work.

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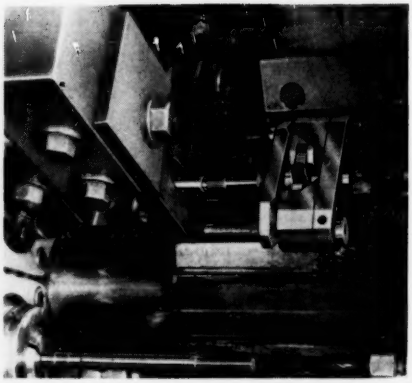
SPEEDGRIP CHUCK 820 N. WARD STREET ELKHART, INDIANA

includes a set of grinding blocks, wheel chuck, wheel guard, splash guards, necessary wrenches, base leveling wedges, and hand-operated wheel dressing fixture.

Self-Closing Knurling Tool Is Designed for High-Speed Precision Knurling

A self-closing knurling tool which can be quickly set up for high-speed precision knurling behind shoulders or at any distance from the end of the workpiece



Barnaby Self-Closing Knurling Tool installed on a six-spindle National Acme machine

on both automatic and hand screw machines has been announced by Barnaby Mfg. Co., Inc., 74 Knowlton, St., Bridgeport 8, Conn. According to the manufacturer, the balanced design of the tool eliminates all transverse thrust, preventing bending of the work and undue stress on the spindle bearings without the use of back rests. The tool, it is claimed, operates directly off any pickup cam, requiring no special camming or synchronization of the lead and cross slide cams. With only a slight variation, the tool can be satisfactorily adapted to National Acme, Gridley, and other similar multi-spindle machines.

The tool is finished by the "Du-Lite" process which is said to provide long life. All spines and edges are rounded off, and the oil absorptive properties are said to reduce friction and prevent galling and scoring. The tool is available in sizes from $\frac{1}{16}$ to $1\frac{1}{4}$ inches in diameter.

D & M AUTOMATIC PRESS GUARD

No Springs • No Cables • Fits Any Machine • Low Initial Cost • Low Maintenance •

• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance. *Write for complete information.*

Immediate Delivery

D&M GUARD Co.

895 Military Rd., Buffalo 17, N. Y.

BOSTON UNIVERSAL ANGLE PLATE

Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes. Write today for full information.

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tools don't slip
tools run true

UNIVERSAL ENGINEERING COMPANY
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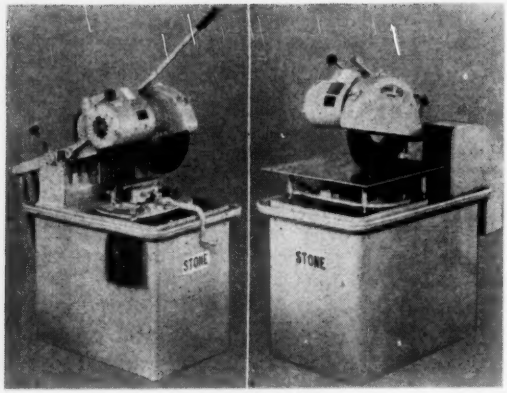

(Left) Stone Heavy-Duty M75 Cut-Off Machine set up as a regular cut-off machine. (Right) Stone Heavy-Duty M75 Cut-Off Machine set up for free-hand cutting of gates and risers from non-ferrous castings

Heavy Duty Cut-Off Machine Can Be Quickly Converted for Free-Hand Cutting

Stone Machinery Co., Inc., 519 Fayette St., Manlius, N. Y., has announced that its heavy-duty M75 cut-off machine is now available as an interchangeable machine which can be used as a regular cut-off machine or quickly converted for free-hand cutting of gates and risers from non-ferrous foundry castings and other uses. When used as a regular cut-off machine, either abrasive blades for cutting ferrous materials or semi high-speed steel saw blades for cutting non-ferrous materials may be used.

The capacity of the M75 as a cut-off machine is 2½-inch solids and 4-inch pipe, tubing, and structurals. The machine is equipped with a full 7½-h.p. geared-in-head motor. The direct drive, without the use of belts or pulleys, is said to deliver full power to the cutting wheel. The machine is claimed to cut all materials at a rate of less than four seconds per square inch of metal.

Enco
TURRET TOOL POSTS
SAVE VALUABLE SETUP TIME

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

¾" square tool bit mounted in Model 4½-S turret used for facing cut.

Same tool used for broadface turning merely by indexing turret one position or 30°.

Same tool used for inside chamfer merely by indexing back two positions or 60°.

✓ Keeps setting accurately.
✓ Indexing is self-contained—eliminates all chip-interference.
✓ Accurate within .0005.
✓ 12-position indexing.
✓ Hardened steel construction.
✓ Mounts rigidly in compound T-slot.

Send for Latest Catalog.

Manufacturers of the most complete line of Hexturret Bed Turrets, Turret Tool Posts and Tail Stock Turrets in the Country. Send for Catalog No. 53.

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TAPER PINS

The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY COMPANY

BEAVER FALLS PENNSYLVANIA

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YOU PROFIT on every job you send to Rutland!

Rutland reworked or repaired cutting tools are guaranteed to give new tool performance — at a fraction of the new tool cost.

Recutting • repairing • replacing Carbide tips. Special tools from obsolete or standard tools, etc.

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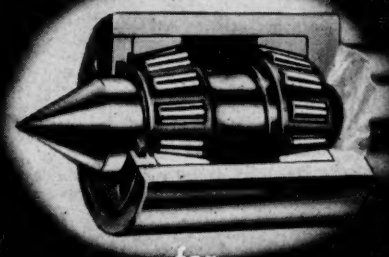


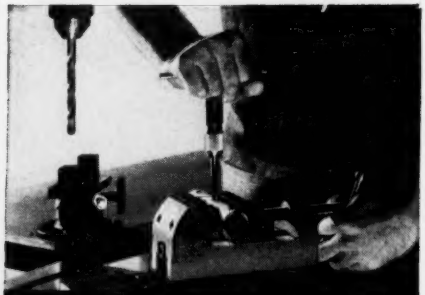
for lathe and grinder tail stocks

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

PRODUCTS Falls INCORPORATED

FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

Speed Up Small Jobs
with
"YANKEE" VISES



"Yankee" Vise, removed from swivel base and held by "Yankee" Vise Clamp for drilling and tapping.

Bench-mounted on quick-release swivel base

Vise lifts on and off swivel base.

Sides, bottom and front end accurately machined.

Machine-mounted with "Yankee" Clamp.

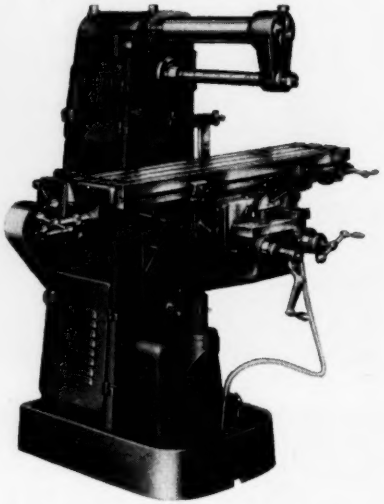
Line up small work just once in a "Yankee" Vise for a whole series of hand and machine operations. Four sizes: 1½", 2", 2¾" and 4" jaw widths . . . with and without swivel base. Hardened steel "V" block for round stock.

Order these time-savers from your industrial distributor.

NORTH BROS. MFG. CO.
202 West Lehigh Ave., Phila. 33, Pa.
Division of Stanley Tools
STANLEY

Milling Machine Features Six Longitudinal Feeds

Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., has introduced the Hero Milling Machine, available in plain or universal styles, with a table size of 39½ x 9¼ inches and six longitudinal power feeds. According to the manufacturer, the machine incorporates anti-friction bearings, a well-constructed knee, 12 spindle speeds, six table feeds, and a 2½-n.p. motor.



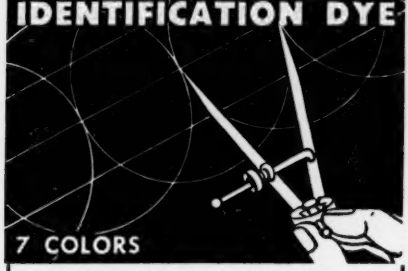
Hero Model 4-P Plain Milling Machine

Electric Drill Kit Is Designed for Shop Use

A ¼-inch electric drill in a kit containing accessories for use in the shop has been introduced by Porter-Cable Machine Co., 1363 N. Salina St., Syracuse 8, N. Y. Identified as the Model 114, the kit consists of a steel carrying case containing, in addition to the electric drill, a set of 13 high-speed twist drills for wood or metal; horizontal drill stand which converts the portable drill into a stationary bench grinder; 4-inch wire wheel brush for removing rust, crackled paint, and other clean-up work; 3-inch buffing wheel with stick of rouge for polishing

Miccro Supreme

LAY-OUT AND IDENTIFICATION DYE



For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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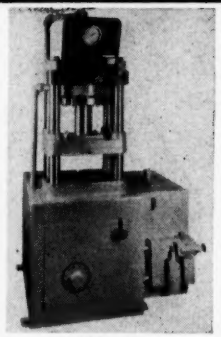

MODEL 23

with the new *Exclusive* UNITROL

Reduce maintenance problems and costs; no broken lines—no valves to disassemble; cut out unsightly piping and valves. Write for 36 page standard press catalog or submit specifications for special presses.

DEALER INQUIRIES INVITED

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299 Allwood Road Clifton, N. J.

Stop and Shop at Rivett's production corner

DRAW-IN COLLETS

Stocked in all standard styles...checked 25 times against master gauges... guaranteed to run "dead true" at collet mouth. Write for Bulletin 100.

THREAD TOOL

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.

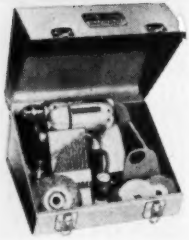
LOCKJAW

Set-ups stay put! Grips both downwards and sidewards... eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.

RIVETT LATHE & GRINDER, Inc.

Dept. MMSA-7

Brighton 35, Boston, Massachusetts



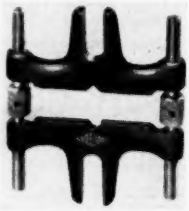
Porter - Cable Model 114 Electric Drill Kit

metals; and 3-inch grinding wheel for contact grinding and implement sharpening. The drill has a Jacobs geared chuck and full-hand pistol grip with lock-button trigger switch. It is driven by a powerful universal motor at 2,000 r.p.m. and weighs 3 lb. 6 ounces.

Also available is a home kit, identified as the Model 113, which includes an electric drill, in carrying case; assortment of four high-speed twist drills suitable for metal or wood; 5-inch rubber back-up pad with three abrasive discs of various grits for sanding wood; and lambs wool buff.

Cutter Grinder Dog Can Be Adjusted to Different Diameters of Work

Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., has announced the development of a cutter grinder dog which, it is claimed can be readily adjusted to different diameters of work. The dog is said to be well balanced and expressly designed for cutter grinders. According to the manufacturer, the dog is particularly suited for small work as its construction permits getting close to the faceplate.



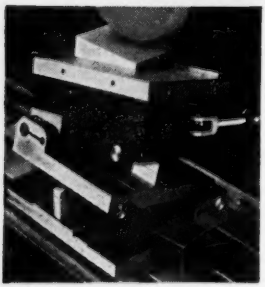
Red-E Cutter Grinder Dog

The Red-E Cutter Grinder Dog is available in two sizes; namely, the No. 100 which has a capacity from ⅛ to 1½ inches and the No. 99 which is designed to accommodate work from ½ to 2½ inches.

ANGULAR SET-UPS

to gauge-block accuracy

IN A FEW MOMENTS



the Magna-Sine

Any angular set-up, single or compound, takes only the time to look up the angle in the Robbins Table of Constants and to insert the indicated gauge blocks between the Magna-Sine plates. It's fast—it's positive, to gauge-block accuracy. Work is held by magnetic attraction. In two models and two sizes; also in non-magnetic models for inspection work.

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Manufacturers of the MAGNA-SINE and Other Precision Tools

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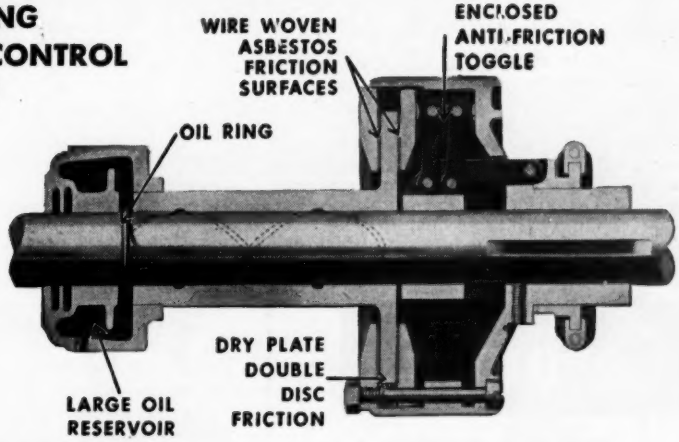
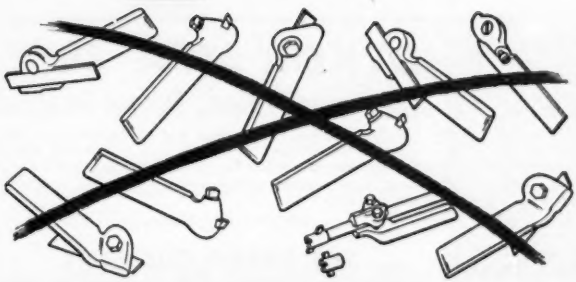
FAST ACTING
POSITIVE CONTROL
LONG LIFE



BROWN
MULE PULL
CLUTCHES

This time-tested clutch provides maximum power transmission at lowest cost. For specifications and prices on wide range of sizes, write for Bulletin No. 25. Brown Engineering Co., 120 N. Third St., Reading, Pa.

ONE ALL-PURPOSE TOOL HOLDER INSTEAD OF TEN

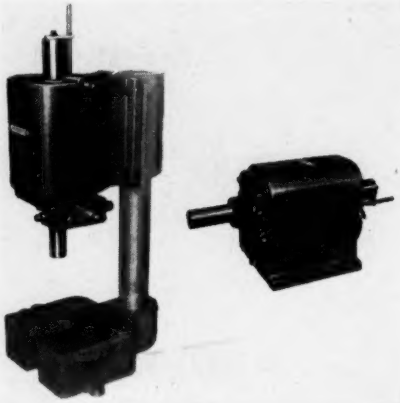


ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝".

ACME TOOL CO.
73 WEST BROADWAY
NEW YORK 7, N. Y.

Head of Impact Hammer Is Available As Separate Unit

Air-Hydraulics, Inc., 259 Belden Rd., Jackson, Mich., has announced that the head of the "Exploded Air" Model Z-2 Impact Hammer is now available as a separate unit and can be mounted at any angle or upside down to accommodate difficult operations. According to the manufacturer, the hammer may be used for light stamping, forging, trimming, molding, crimping, coining, riveting, staking, or forming operations. Operated at 100 p.s.i. line pressure, the head is said



(Left) "Exploded Air" Model Z-2 Impact Hammer. (Right) Head of "Exploded Air" Model Z-2 Impact Hammer

to provide 50 strokes per cubic foot of air at a rate of 60 strokes per minute when operated by either a hand or foot control.

Automatic operation, by the addition of a solenoid valve and guide-rod switches, is claimed to increase speed to 120 strokes or more per minute.

Impact, it is claimed, is easily adjustable to any pressure up to hammer capacity and is then constant at any point during the stroke. Variations in stock thickness or improper positioning is said to be handled without damage to work, dies, or hammer. The head weighs 75 lb. and incorporates a hard chrome-plated cylinder.

Columbia

TOOL STEELS for all tools for all purposes

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HOT WORK-SHOCK RESISTING:

Formite Formite No. 2
Firedie Buster C.E.C.

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TOOL COLUMBIA STEELS

Main Office & Works
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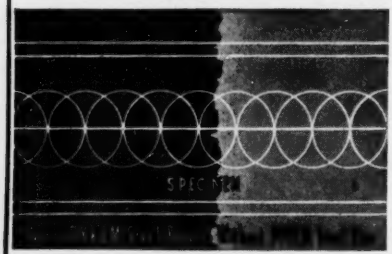


DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2301F NORTH 11TH ST. ST. LOUIS, MO.

SAVE TIME AND MONEY

WITH THIS

CUTTER GRINDING FIXTURE

RUGGED! RIGID! ACCURATE! LOW-COST UNIVERSAL CUTTER GRINDING FIXTURE

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

PRECISION BALL END MILL grinding is done easily with this flexible and compact instrument, it grinds up to 2¼" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

WRITE TODAY FOR DESCRIPTIVE FOLDER No. 602

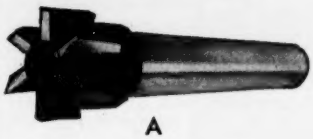
ROCHELEAU TOOL AND DIE CO.

650B NORTH MAIN STREET • LEOMINSTER, MASSACHUSETTS

Export Office: States Trading Co., 401 Broadway, New York 13, N. Y.
Cable Address: STRADESO, N. Y.

APEX INSERTED-BLADE METAL-CUTTING TOOLS

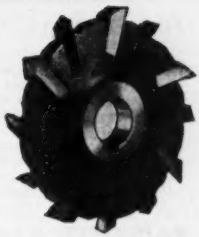
Milling Cutters Stocked in Over 20 Types



A

B

(A) END MILL. (B) COMBINATION BORING AND FACING MILL. Both are made with tapered, serrated blades adjustable to hold diameters. (C) ALTERNATE ANGLE CUTTER. Slots all widths ½" and over, and all diameters 4" and larger. Blades of H. S. Steel, Super Cobalt, Stellite or Carbide Tipped. Write for catalog showing complete line of multiple and single-point tool bits, serrated or round shank.



C

APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.

Lightweight Rod Cutter Has Capacity for 1/8 to 3/4-Inch Diameter Mild Steel Rods

Designated as the No. 400, a lightweight rod cutter which has a capacity ranging from ⅛ to ¾-inch diameter mild steel rod has been announced by Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill. The unit consists of a movable shear blade and a fixed shearing die, both of which are said to be easily replaceable. The blade is moved by a geared 48-inch lever which, it is claimed, provides unusual power and produces a quick, smooth cut. Weighing only 42 lb., the cutter can be easily carried to the work or mounted on a bench in the shop.

Whitney No. 400 Rod Cutter in use

Heavy-Duty Center

Designated as the Mac Heavy-Duty "R," a center which has a roller bearing for thrust and a ball bearing for radial load and which is adjustable to compensate for any wear on the bearings has been announced by The Whitfield Mfg. Co., Washington Court House, Ohio. The center incorporates a spindle made from oil-hardened tool steel and has a long Oilite bearing at the end of the spindle to equalize the load. A Neoprene seal be-

CAMS

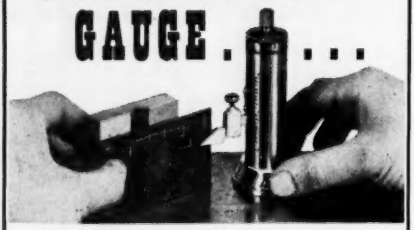
MADE TO YOUR SPECIFICATIONS

LET US HANDLE YOUR CAM PROBLEMS

BLOOMFIELD TOOL CORPORATION

37 Farrand St. Bloomfield, N. J.

MICRO-HEIGHT GAUGE . . . .



FOR FAST, ACCURATE LAYOUT

A new precision height gauge which reads like a micrometer and measures zero flush at base. Has a direct reading of 2" with scriber in upright position, and 3" with scriber reversed.

Replace scriber with dial indicator and Micro-Height Gauge measures center distances between holes or surfaces. As indispensable as a micrometer to toolmakers, layout men, and inspectors.

write for circular and prices

FAIRFIELD GAUGE COMPANY

174 HERBERT STREET

BRIDGEPORT 6, CONNECTICUT

WADE ENVELOPES

protect

Shop Orders, Drawings, Blueprints, Etc.

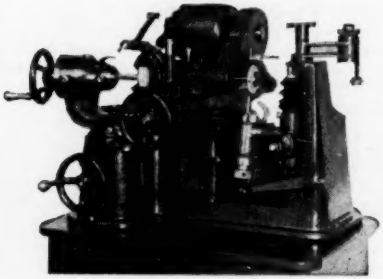
Two styles. No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.

Write for details.

WADE INSTRUMENT COMPANY

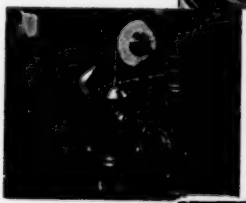
Dept. M, R.F.D. No. 1, Chardon, Ohio

HYBCO
TAP GRINDER



MODEL 1100

CHAMFER Sharpening



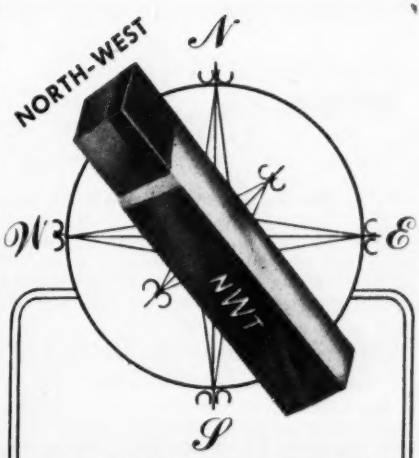
FLUTE Sharpening

GUN POINT Sharpening

• Capacities No. 0 Machine Screw to 1½" Hand Taps.

Henry P. Boggis & Co.

708 East 163rd Street
Cleveland 10, Ohio



GO "NORTH-WEST"

for the best in Carbide Tools

Next time you start out to purchase the best in carbide tools, chart your course to "North-West."

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built flat, single point, carbide cutting tools.

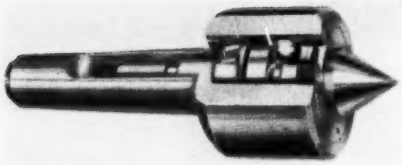
Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

Distributors in all leading cities.

Write for catalog.

THE NORTH-WEST TOOL COMPANY
8 North Kilmer St.
Dayton 7, Ohio



Mac Heavy-Duty "R" Center

tween the two adjusting nuts is said to keep out all foreign matter. The center is available in five sizes to accommodate load capacities from 300 to 4,000 pounds.

Three-Step Grinding Method Is Claimed to Double Tool Life

An unusual three-step tool grinding method which is claimed to double tool life has been announced by The Metalloid Corp., Huntington, Ind. The method combines rough and finish grinds into one operation with average micro finishes of 2½ to 3½ if the work is sparked out. In addition, rates of stock removal are said to be greatly increased without reduction in the physical properties of the tool.

The method involves the use of Metalloid grinding fluid, a mist applicator, and a fine-grain soft-bond wheel which roughs and finish grinds in the same operation. The fluid acts to limit the amount of heat generated in grinding by stressing a surface molecular layer of metal and aids in keeping the wheel free of debris, preventing loading. The mist applicator is employed to apply the fluid in almost vapor form through a fan-tail orifice directly to the wheel surface. The applicator is said to permit the fluid to be metered in a constant volume so small that it is consumed in grinding, thus affording the advantage of wet-ground tools.

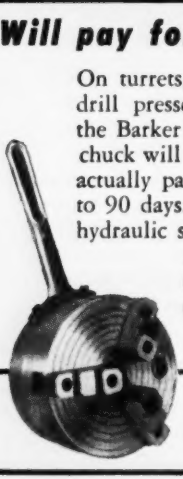
The third step of the process requires the use of fine-grain wheels, approximately 150-H to 180-H. Both silicon-carbide wheels for carbide tools and aluminous-oxide wheels for tool steels are recommended. By using a fine-grain wheel, the conventional rough and finish grinds are combined in one operation. Use of the fine-grain wheel is said to be possible due to the ability of the fluid to control and limit heat in the tool and the combined ability of the fluid and applicator to prevent wheel impaction which would cause the tool to burn.

Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.



CHUCK DIVISION
THOMAS HOIST CO.
28 S. HOYNE CHICAGO 12, ILL.

Sharpens metal saws in gangs milling cutters, too!

Sharpens saws from 2" to 8" in diameter in gangs up to 3¾" thick. Automatically indexes a gang of saws, one row of teeth at a time, and sharpens them with accuracy of ± .001" for entire lot. Salvages milling cutters and saws that might otherwise be scrapped. Write for literature on 57 T automatic grinder.

WARDWELL

Maker of largest line of saw and tool sharpening machines

THE WARDWELL MFG. CO., 3166 Fulton Rd., Cleveland 9, Ohio.

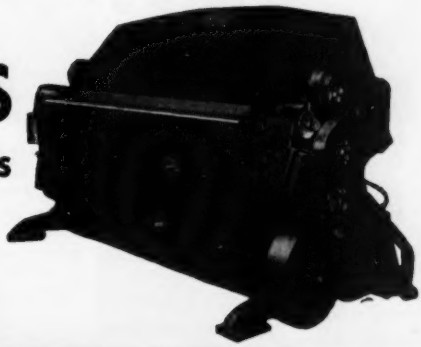
CHICAGO STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE and SHEET METAL

Special Bending Brakes
Double Folder Brakes



DREIS & KRUMP MANUFACTURING COMPANY

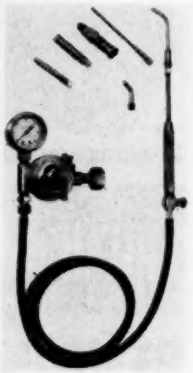
CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

7418 S. Loomis Boulevard, Chicago 36, Illinois

Acetylene Torch Outfit

Designed for practically any light heating, brazing, or soldering operation, an acetylene torch outfit which uses only acetylene gas, from a Presto B tank, yet develops a temperature of 2,800 deg. F., has been placed on the market by Torit Mfg. Co., 296 Walnut St., St. Paul 2, Minn. According to the manufacturer, only a few pounds of pressure are required to operate the torch, the pressure being handled by a regulator and gage that are combined with the tank connection. Four tips, an adapter unit, and a soldering copper are supplied with the outfit. Two long tips—one straight and one curved for reaching hard-to-get-at places—are furinshed. One of the short tips provides a standard flame, and the other tip affords a large brush-type flame.

The soldering copper, it is claimed, reaches proper heat almost instantly and holds that heat until turned off. Rugged construction is said to permit the soldering copper to be used for all kinds of seam soldering. The use of the pressure regulator and welding hose, it is claimed, minimizes any chance of breaks or popped hose connections, even when the torch is turned off at the handle. An adapter tip is said to eliminate the possibility of fume striking back against the air suction holes in the working tips.



Torit Acetylene Torch Outfit

Parker Marking Tools make FIRST impressions LAST!
EVERY PARKER MARKING TOOL AND DIE IS BUILT TO GIVE CONSISTENTLY SUPERIOR SERVICE — PERMANENT, RAZOR-SHARP IMPRESSIONS DAY AFTER DAY, JOB AFTER JOB IMPROVE PRODUCT QUALITY, ASSURE PRODUCTION ECONOMY!
STEEL NUMBER SETS
STEEL LETTER SETS
STEEL HAND MARKING DIES
STEEL TYPE
TYPE HOLDERS
INSERT ROLL MARKING DIES
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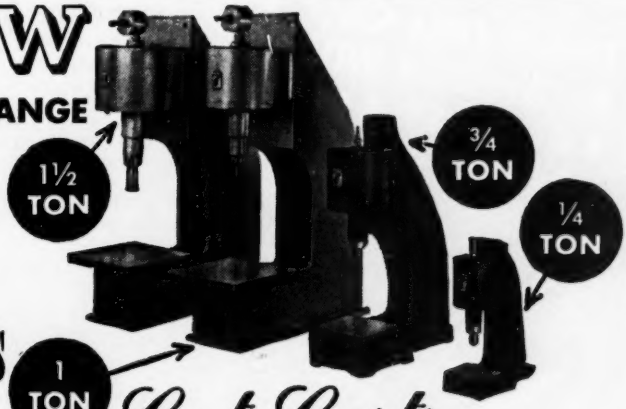
ROLL MARKING DIES
PRESS MARKING DIES
HOT STAMPING DIES
SEND TODAY FOR THE NEW 36 PAGE PARKER CATALOG —
A comprehensive reference of Parker products and services available to in dustry.
THE PARKER STAMP WORKS, INC.
by Parker
FRANKLIN AVENUE • HARTFORD CONNECTICUT

NOW

A WIDE RANGE OF

Air Presses



Cut Costs...

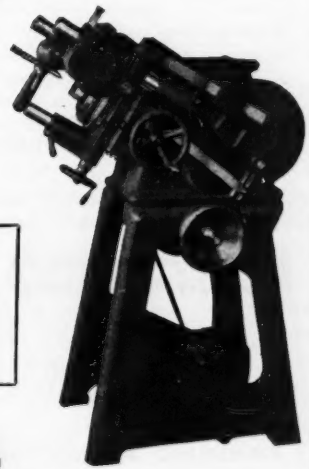
These presses deliver from 4 to 28 times the air line pressure, cost from $27.50 to $135.00, and will pay for themselves many times over in faster, more uniform production on light staking, criming, assembling jobs. Write for new catalog of air cylinders and other air-operated devices.

MEAD SPECIALTIES COMPANY, 4114 N. Knox Ave., Dept. AA-73, Chicago 41, Ill.

Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.
5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.



Write for Literature

CEDAR-WEST TOOL CO., INC.

90 WEST ST. **NEW YORK 6, N. Y.**

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data

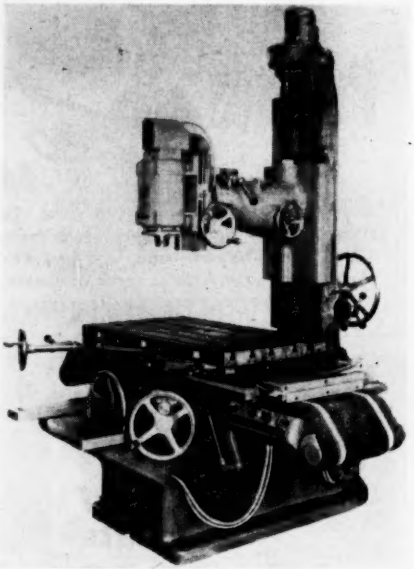
covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 534.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

Patternmakers Milling Machine Features Large Work Table and Deep Throat

The Bokoe Model 2 Patternmakers Milling Machine which features an unusually large work table and deep throat for machining many sizes and shapes of ferrous, non-ferrous, and wood workpieces is now being distributed by Kurt Orban co., Inc., 205 E. 42nd St., New York 17, N. Y. Manual controls on the work table are said to provide for a 28-inch transverse and a 48-inch longitudinal movement. With automatic feed, longitudinal movement is infinitely variable from 3 to 58 inches. Transverse and rotary movement are also provided by automatic feed. The maximum diameter of turntable work is 8 feet 6 inches, and depth of the throat between the column slide and spindle center is 35 inches.



Bokoe Model 2 Patternmakers Milling Machine

According to the manufacturer, a wide range of settings and adjustments, as well as spindle speeds, is provided, and the variable speed changer can be operated without stopping the machine. All operating controls and levers, it is claimed, are easily accessible. The column

Pathon

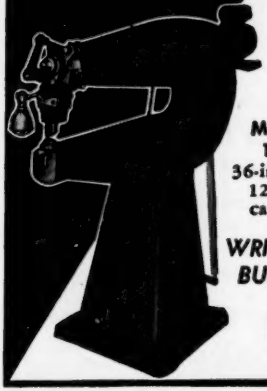
2000 P.S.I. HYDRAULIC CYLINDERS . . . VALVES

Compact, easy to install, Pathon 2000 P.S.I. Hydraulic cylinders and valves offer you efficient, trouble-free operation. Write for our catalog today.

PATHON MANUFACTURING CO. 3827 PACIFIC AVE. CINCINNATI, OHIO

Libert Hi-Speed SHEAR

CIRCLE CUTTING ATTACHMENT Included as STANDARD EQUIPMENT with this Machine



MODEL 1236
36-in. throat.
12-gauge capacity.

WRITE FOR BULLETIN

SIMPLIFIES Maintenance
SPEEDS Production
SAVES Manpower

The *Libert* has amply proved its advantages by turning out top production—shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

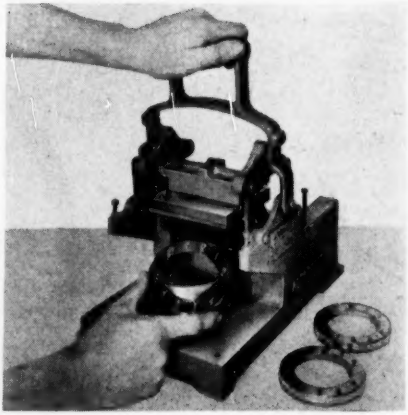
Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY
Green Bay, Wisconsin

and vertical slide are fitted on the base which also supports the longitudinal slide, cross slide, and work table. The work table can be swiveled for performing circular work.

Machine Expedites Placing of Color in Dial Numbers

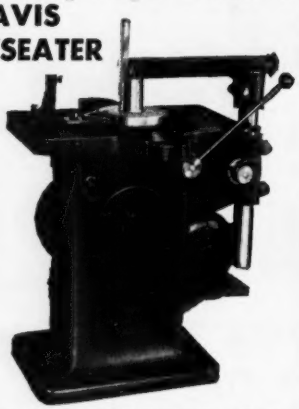
A bench-type hand-operated machine that applies color to machinery, instrument, clock, and television dials has been developed by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. The machine, which can also be furnished in foot controlled and power and motor-driven models, is a kind of printing press, utilizing an inking roll and revolving platen. According to the manufacturer, the printing plate, or die, is made of synthetic rubber and molded to exactly match the numbers, letters, and design of the dial. Being vulcanized and bonded to a metal plate, the dies are said to be quickly removable, replaceable, and adjustable.



Acromark Dial Color Applying Machine in use

In operation, the operator moves the top handle forward in a rocking motion to pick up the enamel, paint, or ink color. On the return stroke the color impression is made in the number of the dial. The machine, it is claimed, is capable of filling from 20 to 50 dials per minute and can be adapted to each special dial by the construction of the required holding fixture and by molding of the required die.

Why Use A Shaper
to cut Keyways when a DAVIS KEYSEATER



will do the job so much quicker and better?

•

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DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

WALTHAM SUB-PRESSES *. . . for precision work*

Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes. Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use.

Write for further information.

WALTHAM MACHINE WORKS

WALTHAM, MASS.

SMALL
PRECISION
PINS

Made to Blueprint

DOWEL • STRAIGHT
COUNTERSUNK • TAPER
±.0001" Accuracy
.030" to .125" Diam.
Up to 2" Length

Precision Centerless Grinding Since 1931

INQUIRY INVITED ON YOUR VOLUME REQUIREMENTS

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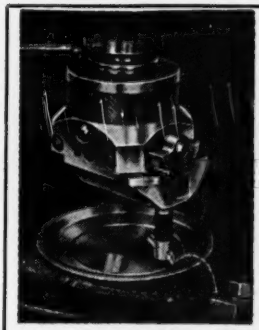
GRINDING CO.
6605 CEDAR AVE.. Phone EN 1-3412 CLEVELAND 3, O.



ONE Tool
ONE Set Up

...for boring, facing, turning, recessing, undercutting.

MASTERHEAD

THE BORING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; nine models for work up to 36¼" diameter.

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KARL A. NEISE
404 4th Ave., Dept. MMS, New York 16, N. Y.

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE • FLOOR AND BENCH MODELS
For Tools and Small Parts

SHOWN HERE

THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING

Max. Temp.	Sizes	Price
2000°	12" x 8" x 18" 12" x 8" x 24" 12" x 8" x 36" 15" x 12" x 30"	$985 to $1350

All prices are less controls. Any standard controls available for automatic temperature control.

- With Cooley design, the door is virtually another wall, equally insulated with the others—entire hearth is usable.
- Natural thermal convection.
- Easily removable heating elements.

Brown and Wheelco Control Pyrometers carried in stock—available for all applications.
Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

COOLEY
ELECTRIC MANUFACTURING CORP.
34 SO. SHELBY • INDIANAPOLIS, IND.

KIPP
Air Grinders

• FASTER SPEEDS
• BETTER RESULTS
• LOW PRICES

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42
IN U.S.A.

THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.
208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

Grinder Is Capable of Performing A Wide Variety of Work

Designated as the "Rotamatic" Type A, a dual-head grinder which is said to permit application to a wide variety of work by means of predetermined angular movement, or graduated swivel mounting for optional movement, has been announced by The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio. The grinder, it is claimed, has a completely automatic cycle and is operated

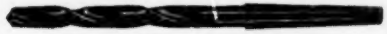
Standard "Rotamatic" Type A Dual-Head Grinder

by a hydraulically-controlled air cylinder. The machine is also available with complete hydraulic operation.

Easy access is provided to all equipment inside the base, consisting of a belted motor drive with a mechanical brake, solenoids, valves, motor - driven coolant pump with reservoir, and, when required, accessories for a magnetic chuck. A removable wheel dresser positioned on the work holder with an air-powered ram is said to permit the dressing of wheels simultaneously. Lateral micrometer adjustment is provided on each grinder head to compensate for wheel wear and wheel dressing.

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION



Special Lengths and Types
PROMPT DELIVERY
Manufacturers Since 1903

HI-DUTY DRILL WORKS
FLEETWOOD, PA.

SOMERSET Radius Dresser SAVES TIME

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.

Write for illustrated folder. *Immediate Delivery.*

SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.

GRANT RIVETERS

• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. *Write for literature—and don't forget to send samples.*

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

Zagar gearless drillhead, 12", 24-spindle; capacity up to 5/8" steel.

CHOOSE Zagar GEARLESS DRILLHEADS to Drill on ALL Centers

They (1) can drill practically any number of holes at one pass, up to 600 or more; (2) can drill any material; (3) can drill in any pattern; (4) can "come down to" distances between holes as small as twice the drill diameter; (5) can and do maintain accurate spacing. Zagar gearless drillheads can be furnished as complete units or can be adapted to any standard drill press. Your parts drawings and full data will bring you a prompt quotation.

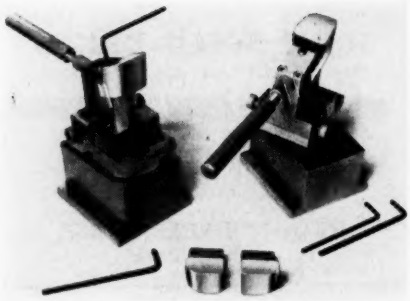
Write for Engineering Manual S-7.

ZAGAR TOOL, Inc., 24000 Lakeland Blvd.
Cleveland 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

Radius Grinding Fixture Is Designed for Cutting Journal Bearing Surfaces

A radius grinding fixture for redressing radius tools of the serrated inserted type used for finishing axles with ⅛ to ¾-inch radii has been developed by The Apex Tool & Cutter Co., Inc., Shelton 15, Conn. The fixture is designed to regrind the ¾-inch radius on both right and left-hand tools to provide a true radius for cutting journal bearing surfaces. The unit features built-in adjustments to allow for tool wear both on the length and width and is built with opposed roller bearings for rigidity. The fixture, it is claimed, will fit any table of a standard tool and cutter grinder, as well as those of most grinders with a mechanical in-feed handwheel.



Apex Radius Grinding Fixtures

According to the manufacturer, the fixture is designed primarily for ¾-inch radius grinding; however, it can also be used to grind or dress other radii within a range of from approximately ⅜ to 1⅛ inches.

General-Purpose Level Has Excellent Sensitivity

Designated as the "Gray 90," a general-purpose level which is said to have excellent sensitivity has been announced by Gray Instrument Co., 64 W. Johnson St., Philadelphia 44, Pa. According to the manufacturer, the body of the level is made of well-seasoned cast iron and has a groove in the bottom so that the level can be used for shafting, as well as plane surfaces. The main vial is ground, and

ACROMARK

Series 9A—
Power Driven

POWER MARKING MACHINES

are the last word for high production, high precision marking. A powerful gear reduction motor does the driving. Clutch operated. Fast, smooth and quiet.

Model 9 AMP—Motor Driven, Pedestal Model Shown.
Write for latest color folder.

The ACROMARK Company

9 MORRELL ST., ELIZABETH 4, N. J.
"THE ORIGINAL MARKING SPECIALISTS"

OUT WITH OLD BORING *and* FACING METHODS

NOW

Boring, Facing, Turning, Grooving, Undercutting—All in One Toolhead.

Re-Designed New Features

WRITE FOR DETAILS

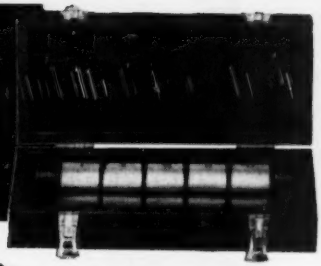
CHANDLER TOOL COMPANY, Muncie, Ind.

Six Sizes

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

Check Surface Roughness Waviness and Lay INSTANTLY

. . . Right At The Machine



With ACME'S ROUGHNESS COMPARISON SPECIMENS

Available in groups of 3, 5 and 8 specimens. Low cost.

Consists of various surface specimens, *individually finished* to definite micro-inch readings, grouped together in one handy comparison bar. Merely hold bar opposite work for fast, visual comparison check of surface roughness, waviness and lay.

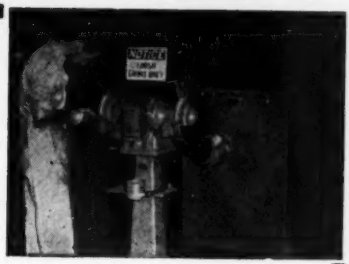
ACME INDUSTRIAL COMPANY

Mfr's. of Drill Jig & Fixture Bushings
212 N. Laflin St. Chicago 7, Illinois

THE SERVICE SHOP TO INDUSTRY FOR OVER A QUARTER CENTURY

STOP DUST

With DUSTKOP



300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

Low cost, immediate control of dust from one remote dust source, or from a whole shop!

Ask for catalog 605-2

No obligation.

AGET-DETROIT CO.
207 Main St. Ann Arbor, Mich.

Economy

TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST

Your job can be no better than the tools applied in the making. You'll find that ECONOMY'S close-tolerance drill-jig bushings and gages meet your exact specifications and high production standards. Write for bulletin and price list on all A.S.A. standard types and sizes, as well as new gages and gages salvaged by hard chromium plating.

Economy
TOOL & MACHINE CO.

1827 S. 68TH ST., MILWAUKEE 14, WIS.

the bulb, it is claimed, will move one division for an inclination of 0.005 inch in one foot. The level is available in 6,

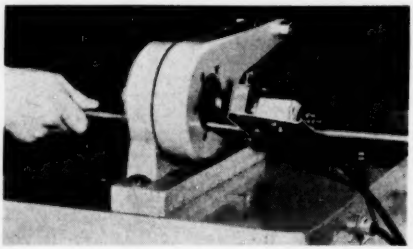
"Gray 90" General Purpose Level

8, and 12-inch lengths. Each model has cross vials, and the 12-inch model has a plumb vial as well.

Gage Speeds Cutting of Bar Stock with Di-Acro Power Rod Parter

Designated as the Micro-matic, a gage which is said to make it possible to maintain in excess of 9,000 cuts per hour in bar stock with the Di-Acro Power Rod Parter has been announced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. In operation, the operator sets the gage for the desired length of cut, inserts the material in the proper hole in the cutting heads (10 hole sizes are provided for accommodating stock from $\frac{1}{16}$ to $\frac{5}{8}$-inch diameter), and pushes the material through the heads flush against the gage. The contact made is relayed to a solenoid which trips off the cutting action and allows the cut part to be ejected. The operator merely feeds the stock through the cutting heads as there is no foot or hand controls.

According to the manufacturer, the rate of production is governed by the



Micro-matic Gage installed on Di-Acro Power Rod Parter

lengths of stock to be cut. Shorter lengths can be gaged and cut faster than longer lengths.

Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to ¾" U.S.S. Inexpensive — Last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
P. O. Box 1067
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SAVE YOUR DIAMOND WHEELS

Precision
Diamond Wheel Oil
"For Grinding Carbides"

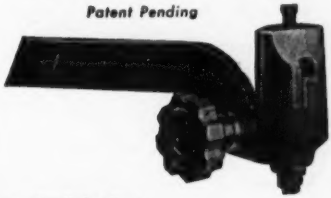
- No Loading or Glazing
- Grinds Faster, Cooler, Cleaner
- Finer Tool Edges
- Longer wheel life

Used by Leading Manufacturers.

We also make diamond wheel oil Applicators for use on various type grinders. *Write for Circular.*

CARBIDE FINISHING PRODUCTS, Milford, Conn.

Monarch Precision
SHAPLANE
Radius Tools
Patent Pending



Five Models for
LATHES, SHAPERS, PLANERS, AND BORING MILLS.

RANGE ½" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

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Tool Room Specialties
4470 Oakenwald Ave., Chicago 15, Ill.
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AIR CYLINDERS

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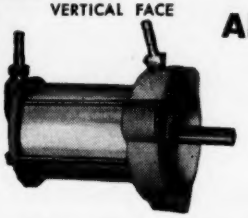
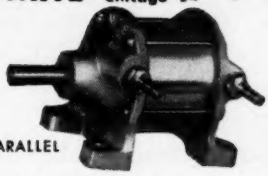
SAVE time, spoilage, cost . . . speed production . . . reduce fatigue . . . on all drilling, reaming, tapping and processing jobs. Available in 1", 1½", 2¼", 3", 4" and 5" diameters; stroke length optional. Single or double action; all mountings.
Write for complete catalog of Air Cylinders and Air Arbor Presses.

VERTICAL FACE

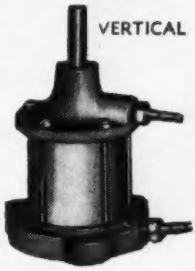


AIR-MITE 4417-H West Carroll Ave. Chicago 24 • Illinois



PARALLEL

VERTICAL



Horizontal Broaching Machine Has Broaching Speeds up to 300 F.P.M.

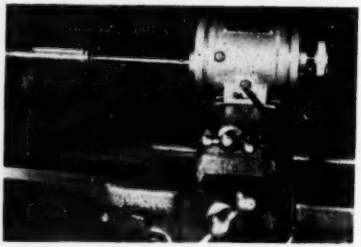
An electro-mechanical drive horizontal broaching machine which is said to have broaching speeds up to 300 f.p.m. and more has been announced by The Lapointe Machine Tool Co., Hudson, Mass. The machine features dual speed, which permits the machine to be operated at two or more predetermined speeds for the same broaching stroke, and dual cycle which is designed for the successful broaching of jet engine components without requiring tool change-overs. A large main driving gear of the herringbone type drives the slide which rides on phenolic ways. The main slide is said to be adjustable, guided, and supported throughout the entire stroke. The slide is available in 16 and 24-inch widths, with strokes up to 180 inches, and drives up to 200 h.p. can be furnished, depending on the speed desired and the amount of material to be removed.

Close-up view of Lapointe Electro-Mechanical Broaching Machine showing limit switches for dual speed and dual cycle operation

The machine utilizes simplified electronic controls which are said to be flexible for setting-up purposes and which have a locking attachment to prevent damage to the machine, tools, or operator when the automatic cycle is used. Cutters are at eye level and can be easily examined at any time. The machine can be furnished with either an in-and-out table or a tip-down table. Indexing fixtures or other special work-holding units, it is claimed, can be easily adapted to the table.

THEMAC

high speed, portable, Tool Post Grinders



Type J-45 with 6" extension spindle grinding a hardened sleeve in a 14" lathe.

The McGonegal Mfg. Co.

East Rutherford, N. J.

Specify DESTACO **FEELER STOCK**

For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".

DESTACO **DETROIT STAMPING COMPANY**

349 MIDLAND AVENUE • DETROIT 3, MICHIGAN

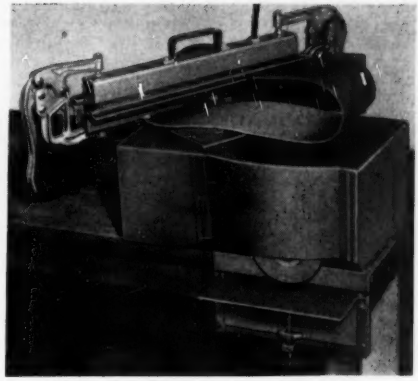
Cold Chisels and Steel Punches

Cold chisels and six styles of steel punches have been announced by The Billings & Spencer Co., Hartford 1, Conn. Each cold chisel is forged from tool steel, hardened and tempered. The standard size chisel is available with cutting edges ranging from ¼ to 1 inch, has an octagon shank for non-slip grip, and has a polished finish. An extra long cold chisel is available with cutting edges ranging from ⅝ to 1 inch in lengths of 12, 15, and 18 inches. The 18-inch size is supplied with a natural finish.

The punches are made of octagon tool steel, hardened and tempered. Points and tapers are said to be precision ground and heat treated. Six styles of punches are available; namely, center punch, prick punch, solid punch, pin punch, extra long pin punch, and long taper punch. The punches are offered in all standard sizes and diameters with polished finish.

Improved Abrasive Belt Splicer Decreases Splicing Time

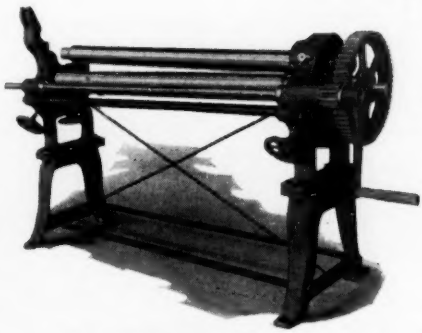
Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., has announced several improvements and changes in the Econaway



Econaway Improved Abrasive Belt Splicer

Abrasive Belt Splicer, designed to increase the speed of splicing abrasive belts, to improve the quality of splice, to save shop bench space, and to allow a large saving in the cost of abrasive belts. In the improved machine, the motor, belt drive, and arbor which carries the grinding wheel are enclosed; cutter and press

Beloit **SLIP ROLL HAND FORMING MACHINE**



This Popular Beloit Slip Roll Forming Machine is supplied as single back geared hand operated rolls in bench type or floor type and double back geared floor type. Also supplied for power operation if desired.

The two feed rolls are geared together insuring positive feed of the thinnest material through the machine. Third roll is idle but can be furnished as gear driven.

Top roll is raised by quick acting cam lever for removal of completed cylinders. Release of lever returns roll to original position, ready for a duplicate piece.

Quality engineered and built for long, dependable operation.

Write for Catalog No. 14E today.

HENDLEY & WHITTEMORE CO.

110 BLACKHAWK BLVD. • **BELOIT, WISCONSIN**

Builders of Punches, Shears and Bending Rolls Since 1900

bars are mounted on top of the enclosure so that the operator can perform the various splices without moving from one station to another; and an electrical curing press is said to reduce the curing time from 24 hours to less than 60 seconds.

The C-clamps have been replaced with toggle clamps which are fastened to the lower segment of the press. The new press is not only electrically heated but the temperature is controlled at the correct level by a preadjusted thermostat. Quick accessibility is said to be provided for the occasional oiling of the motor and greasing of the arbor.

LUBRICATE CENTERS in 50% LESS TIME

Centers lubricated on lathes and grinders by quick, single "bump" against "H. K. Lube Dispenser." No messy open can of white lead or ever-elusive oil can.

AVOID RUN-OUT! Lubricant sealed-in and flushes outward, keeping center free from borings and chips. Easily mounted on work bench or machine. For greater production . . . greater safety . . . use an "H. K. Lube Dispenser."

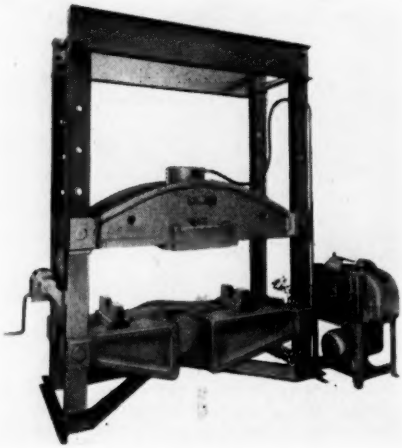
H. K. LUBE DISPENSER

H. K. TOOL CO., WAUKESHA, WIS.

WANTED: Distributorships from Coast to Coast

3-in-1 Open Yoke Press Is Available in 100, 200, 300, and 400-Ton Capacities

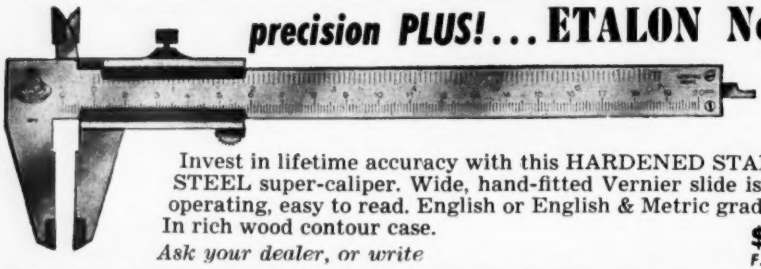
Available in 100, 200, 300, and 400-ton capacities, a 3-in-1 open yoke press fea-



Rodgers 3-in-1 Open Yoke Press

turing rugged, machined V-blocks which are accurately centered in the yoke member groove has been announced by Rodgers Hydraulic, Inc., 7447 Walker St., St. Louis Park, Minneapolis 16, Minn. A wear collar is supplied for inserting in the yoke recess, as well as a bed plate insert to cover the recess and provide a continuous flat working surface on the machine.

Other features of the press include a movable cylinder with a locking device



precision PLUS!...ETALON No. 17

Invest in lifetime accuracy with this HARDENED STAINLESS STEEL super-caliper. Wide, hand-fitted Vernier slide is smooth operating, easy to read. English or English & Metric graduations. In rich wood contour case.

$21.95 *F.O.B., N.Y.*

Ask your dealer, or write

ALINA CORPORATION • 401 BROADWAY, NEW YORK 13, N. Y.

Colonial Horizontal Broaching Machine equipped with traveling broach carrier

to provide full pressure across the entire width of the press; clear open ends to permit the entrance of long material; a hand-operated winch to raise or lower the bolster; and a choice of hand-operated or power-driven hydraulic pumps.

Traveling Broach Carrier Is Designed to Reduce Multiple Broach Handling

Time and effort on operations requiring the use of multiple broaches in sequence are said to be reduced by a handy broach carrier rack which is attached to and travels with the ram of a horizontal broaching machine. Available from Colonial Broach Co., P. O. Box 37, Harper Station, Detroit 13, Mich., the rack can be designed to be adapted to any standard Colonial horizontal broaching machine where broaches are manually handled.

As the ram moves back and forth, the rack carrying the broaches moves with it. After each broaching pass, the broach is removed and placed in the rack. The ram is returned to a starting position, and the next broach is selected from the rack and inserted in the puller. Broaches are also said to be protected from damage to a great extent since the rack, with its padded broach supports, eliminates the operator's carrying broaches to and from stationary racks.

Micrometers

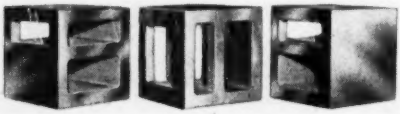
● Measuring parts for watches or tractors . . . warships or jet planes . . . in multi-million dollar plants . . . or in basement workshops, Tumico micrometers give the accurate answers, precisely and quickly.

Whether your production calls for the use of a simple hand "mike", or high production dial indicator comparators, as shown at the left, there are Tumico precision tools to make your production flow smoother and faster. Write for our new catalog.

TUBULAR MICROMETER CO.
BOX 40 • ST. JAMES, MINNESOTA

Universal Box Angle

The Challenge Machinery Co., Grand Haven, Mich., has developed a universal



Challenge Universal Box Angles

box angle which is said to combine the advantages of a box parallel, a right angle iron, and an angle plate. According to the manufacturer, the box angle has the clamping facilities of an angle iron; the stability, balance, and accuracy of a box parallel; and the perpendicular flat surface of an angle plate. Made of semi-steel with a precision-ground finish, the box angle is available in two sizes; namely, 6 x 6 x 6 inches and 8 x 8 x 8 inches. Other sizes can also be made.

Motor-Driven Coolant Pump

A self-contained motor-driven coolant pump which is said to be quickly and easily adaptable to a wide range of work has been announced by Viking Industries, Rockford, Ill. The pump

Viking Motor-Driven Coolant Pump

is powered by a 1/30-h.p. oil-sealed motor and is designed to operate efficiently with all types of water soluble coolants and oils up to 20 S.A.E. viscosity. Said to be ideal for interchangeable applications, the unit has a rated capacity of 100 g.p.m. at a one foot head, and the motor is a shaded pole

BARNES HACK SAWS — BAND SAWS BARNES

BARNES ROCKET

POWER and HAND HACK SAWS ARE IN DEMAND FOR PRODUCTION CUTTING

GRADIENT HARDNESS

DETROIT BARNES U.S.A.

1. HIGH SPEED STEEL
2. FLEXIBLE—TOUGH
3. SAFE—SHATTER-PROOF
4. MEETS EVERY SHOP TEST
5. FOR ALL-PURPOSE CUTTING

W. O. BARNES CO., INC.

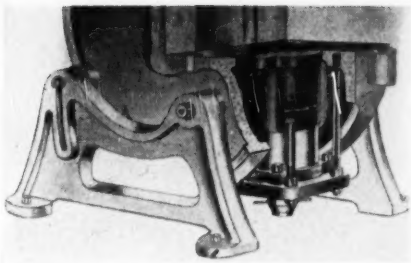
1287 TERMINAL AVE., DETROIT 12, MICH.

type, operating on standard 110-volt 60-cycle a.c. at 1,500 r.p.m. A centrifugal pump is mounted directly on an extended drive shaft of the motor. The inlet pipe has a ½-inch opening and is equipped with an automatic foot valve to hold prime. The flexible spout outlet is ¼ inch in diameter.

The complete unit weighs 3 lb. and measures 4½ inches in diameter x 15 inches high. The housing is made from heavy-duty brass, and the spout is flexible spring steel tubing connected to a copper shutoff cock.

Universal Pneumatic Die Cushion for Inclinable Presses

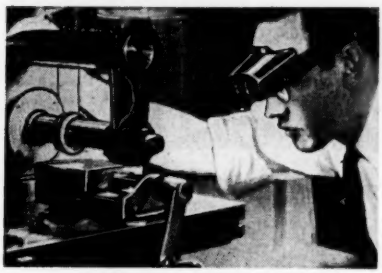
Designated as the Model DB, a fully-universal pneumatic die cushion which is designed primarily for inclinable presses and which can be used with or without a surge tank has been announced by Dayton Rogers Mfg. Co., 2824 13th Ave., Minneapolis 7, Minn. According to the manufacturer, an internal guiding means is utilized to compensate for off-center loading of the pin pressure pad, which is hardened and ground and can be machine-fitted to the entire press bed opening. A combination reducing regulating valve and pressure gage is said to assure constant work pressure on the pin pressure pad at all times, the pressure of which is recorded directly on the pressure gage.



Dayton Rogers Model DB Full Universal Pneumatic Die Cushion

The cushion is available in eight sizes ranging from 5 to 18 inches and producing ring holding pressures of from 1 through 14 tons on 100-lb. air line pressure. The cushion can also be provided for bolster plate mounting.

People work better when they SEE BETTER



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Precision machinist working on a milling machine finds Magni-Focuser an invaluable seeing aid.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Precision workers do the job faster and more accurately with a Magni-Focuser — the proven binocular magnifier.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Now aiding thousands of workers, the Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

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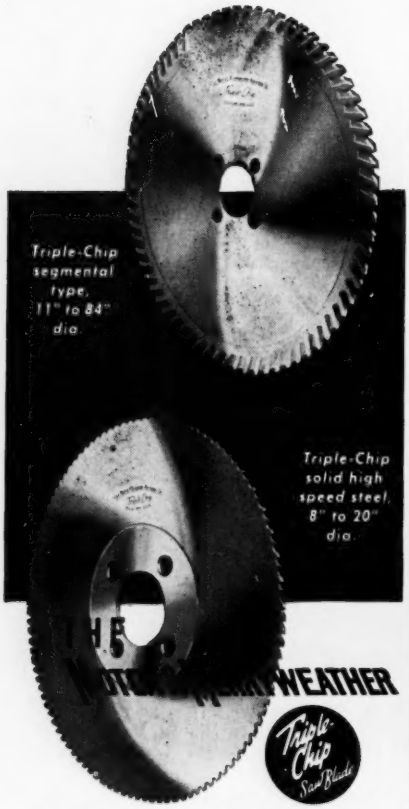

Triple-Chip segmental type, 11" to 84" dia.
Triple-Chip solid high speed steel, 8" to 20" dia.
THE MOTCH & MERRYWEATHER
Triple-Chip Steel Blade

GIVES YOU *EXCLUSIVE* ADVANTAGES IN CUTTING OFF STOCK FAST AND *ACCURATELY*

Fast, burrless cut-off of shapes and tubes up to 30" round. Let M & M Triple-Chip saw blades give you the higher *production-with-accuracy* which Industry must attain and maintain. Ask your dealer.

* * *

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO

Triple-Chip METHOD

REMEMBER — IT'S THE COST PER CUT THAT COUNTS!

Only M & M builds ALL 3: CIRCULAR SAW, SAW BLADE, BLADE GRINDER

Roller Bearing Slide Racks Handle Heavy Bins or Boxes

Stackbin Corp., 1083 Main St., Pawtucket, R. I., has announced the addition of roller bearing slides to its Stackracks that allow even the heaviest bins or boxes to slide as easily as drawers in a file. The roller bearing slide racks lock together without tools to form storage units of any size, shape, or capacity. Tote boxes or Stackbins can be stored in the racks like drawers, keeping small parts and materials easily accessible.

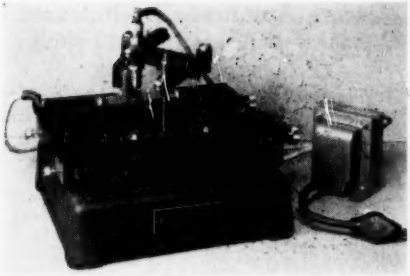
Stops prevent the roller bearing slides

Stackracks equipped with roller bearing slides

from being pulled out more than halfway, so that loaded boxes cannot fall or spill, but still permit easy access and removal.

Electric Attachment Makes Possible Etching of Hardened Steel Surfaces

An electric etching attachment which, when used in conjunction with the Mico Engraving Machine, makes it possible to create characters on hardened steel surfaces has been announced by Mico Instrument Co., 76 Trowbridge St., Cambridge 38, Mass. The attachment consists



Electric etching attachment installed on a Mico Engraving Machine

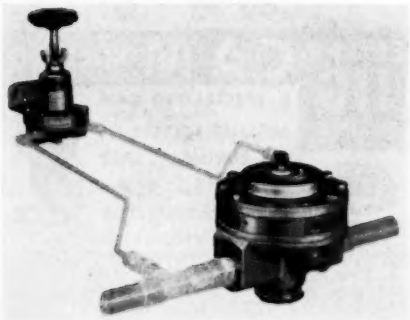
of an etching spindle assembly and a special spring-loaded stylus. In use, the new etching spindle replaces the usual engraver micrometer spindle assembly and the spring-loaded stylus replaces the conventional stylus, with the motor being removed from the pantograph arm.

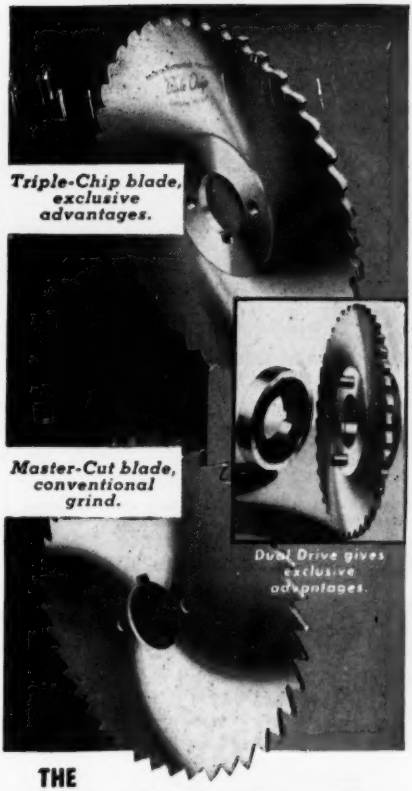
The attachment incorporates its own power source which is said to provide a choice of three output ratings. The rating to be used depends on the hardness of the workpiece. A tungsten point, provided on the end of the etching spindle, is said to be easily replaceable.

Regulator Is Designed for Precision in Air Control

An air-operated regulator which incorporates a pilot-controlled air-pressure regulator designed for extreme precision in air control over an operating range from 2 to 120 p.s.i., with a capacity to de-

Norgren Pilot-Controlled Air Pressure Regulator





THE MOTCH & MERRYWEATHER OFFERS YOU EXCLUSIVE ADVANTAGES FOR SLITTING AND SLOTTING

Triple-Chip Saw Blades

• Let M & M Triple-Chip saw blades give you the higher *production-with-accuracy* which Industry must attain and maintain today. Also Master-Cut conventional grind with exclusive Dual Drive. Ask your dealer.

* * *

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO

Triple-Chip METHOD

REMEMBER—IT'S THE COST PER CUT THAT COUNTS!

Only M & M builds ALL 3: CIRCULAR SAW SAW BLADE

liver more than 200 c.f.m., has been announced by C. A. Norgren Co., 3435 S. Elati St., Englewood, Colo. The pressure regulator, it is claimed, can be placed where it will be most effective, and the separate pilot-control regulator can be installed at the most convenient location.

The pilot-controlled regulator utilizes regulated air pressure to control the delivered air pressure, minimizing the effect of fluctuating line pressure as a factor in delivering uniform working air pressure. It is available in ½, ¾, and 1-inch sizes.

BREMIL
The IMPROVED Compound Lever Shears
ALL ALLOY FULLY GUARANTEED
Two Sizes
PORTABLE
No. 1 cuts up to No. 11 gauge strip or sheet
No. 2 cuts up to ¼" steel plate.
BREMIL MFG. CO.
1400 Pittsburgh Ave., Erie, Pa.

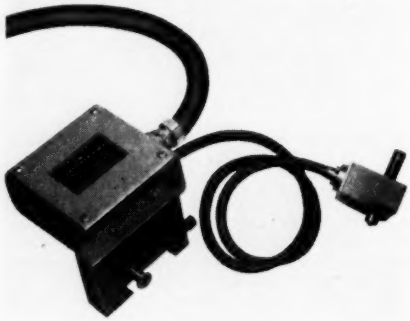
HAND TAPPING with MACHINE PRECISION
Adapts for LATHE USE
59.50 F.O.B. FACTORY

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 13" x 8" x 14". Included 9 adaptors (8-32 to ¾"). Taps not furnished. Branch Mfg. Co., North Branch, Minnesota. *Write for Pamphlet—Also shows Chucks and Autostops.*

Dahlstrom TAP GUIDE

Device Automatically Indexes Dressing Diamond by Positive, Precise Increments

Industrial Diamond Co., 2392 Wolcott, Ferndale 20, Mich., in cooperation with



Industrial Diamond Turner

Corr Instrument Company, has announced the development of a diamond turner, a compact self-contained electro-mechanical device designed to automatically index the dressing diamond by positive, precise increments which will continually present a new sharp diamond edge for each wheel dressing. According to the manufacturer, the device will rigidly support a standard shank diamond tool and will provide ranges of indexing to meet all grinding requirements in odd increments of rotation.

The diamond turner unit is compact and can be slipped into the existing diamond holder of the machine. The control box is wired to the nearest 115-volt a.c. outlet and is secured so that the actuator plunger can be tripped by move-

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A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION
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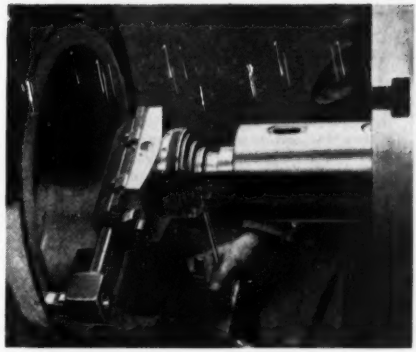
ment of the dresser slide. A sturdy bearing and mechanical lock is said to assure rigidity during use.

Facing Heads Have 31-1/2 and 36-1/4-Inch Capacities

Karl A. Neise, 381 4th Ave., Dept. MMS, New York 16, N. Y., has announced the addition of two new models, designated as the Model UPA 6 and the Model UPA 6-S7, to its "Masterhead" line of universal facing and boring heads. The Model UPA 6 has a boring and facing range up to 31½ inches, and the Model UPA 6-S7 has a capacity up to 36¼ inches.

The Masterhead, it is claimed, is applicable to boring mills, jig borers, radial drilling machines, lathes, millers, and other machine tools, as well as to production units, and can be used for boring, facing, recessing, undercutting, taper, and form turning, as well as for threading stationary work without reclamping. Each new model features a greater range and heavier construction, and the rigidness of the head is said to permit heavy cuts under strenuous conditions. The Masterhead has an automatic feed, end release and end return, and adjustable stop, and is adaptable to all standard machines.



"Masterhead" Universal Facing and Boring Head in use

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EXTRA L-O-N-G LENGTH

Straight Shank

HIGH SPEED DRILLS

Immediate Delivery

12" LONG . . . 9" CUTTING FLUTE

Size	Net	Size	Net	Size	Net
1/8	$1.65	19/64	$2.25	15/32	$3.60
9/64	1.65	5/16	2.25	31/64	3.60
5/32	1.65	21/64	2.50	1/2	3.60
11/64	1.65	11/32	2.50	17/32	4.00
3/16	1.65	23/64	2.75	9/16	4.25
13/64	1.80	3/8	2.75	19/32	4.50
7/32	1.80	25/64	3.05	5/8	4.80
15/64	1.95	13/32	3.05	21/32	5.20
1/4	1.95	27/64	3.30	11/16	5.60
17/64	2.05	7/16	3.30	23/32	6.00
9/32	2.05	29/64	3.60	3/4	6.50

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Universal Dividing Head Is Available in 6, 10, and 12-Inch Swings

Described as an accurate machine tool accessory, a universal dividing head which is identified as the Model DD and which is available in three sizes with 6, 10, and 12-inch swings, respectively, has been announced by The Carroll Dividing Head Co., 3525 Cardiff Ave., Cincinnati 9, Ohio. The unit is constructed for both right and left-hand operation and can be used as a standard 40-to-1 ratio crank-indexing dividing head or as a direct indexing head.

An auxiliary swivel base, available for use with the head, is said to make possible quick accurate work setting to compound angles. The base is graduated in 360-degree increments and permits the head to be swiveled 110 degrees—10 degrees below the horizontal to 10 degrees beyond the vertical axis—thus converting a conventional dividing head into a universal work head or rotary table. The change from conventional crank indexing to direct indexing is said to be accomplished quickly without the aid of tools or wrenches.

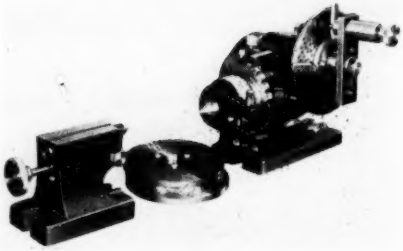
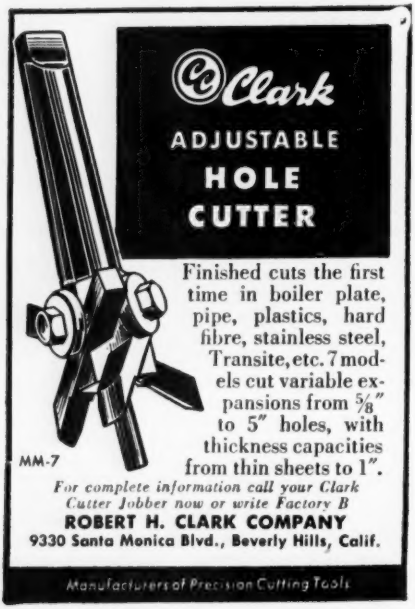


Illustration showing Carroll 6-Inch Model DD Dividing Head together with index plates and tailstock center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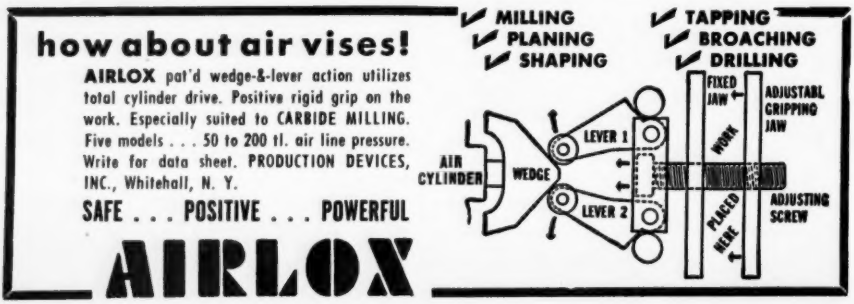
CUTTER
Finished cuts the first time in boiler plate, pipe, plastics, hard fibre, stainless steel, Transite, etc. 7 models cut variable expansions from 5/8" to 5" holes, with thickness capacities from thin sheets to 1".
MM-7
For complete information call your Clark Cutter Jobber now or write Factory B
ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.
Manufacturers of Precision Cutting Tools

Plastic Covers Are Said to Protect Sensitivity and Accuracy of Balancing Ways

Anderson Bros. Mfg. Co., Rockford, Ill., has announced the availability of fitted plastic covers which are designed to protect the sensitivity and accuracy of its balancing ways from dust, emery, or other particles that might settle in the bearings. According to the manufacturer, the covers are durable and washable and


how about air vises!
AIRLOX pat'd wedge-&-lever action utilizes total cylinder drive. Positive rigid grip on the work. Especially suited to CARBIDE MILLING. Five models . . . 50 to 200 tl. air line pressure. Write for data sheet. PRODUCTION DEVICES, INC., Whitehall, N. Y.
SAFE . . . POSITIVE . . . POWERFUL
AIRLOX
MILLING
PLANING
SHAPING
TAPPING
BROACHING
DRILLING
AIR CYLINDER
WEDGE
LEVER 1
LEVER 2
FIXED JAW
ADJUSTABL GRIPPING JAW
WORK
PLACED HERE
ADJUSTING SCREW

can be easily slipped on and off the balancing ways. The covers are available for the Anderson 20, 40, and 60-inch balancing ways.

Black Granite Layout Plate Has Accuracy up to 0.0002 Inch per Foot

An economical black granite layout plate which is straight-sided and does not have clamping edges has been developed by Collins Microflat Co., 2326 E. 8th St., Los Angeles 21, Calif. The layout plate is said to be finished to an accuracy up to 0.0002 inch per foot and is claimed to be ideal for the majority of layout operations.

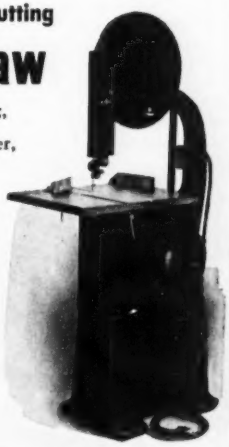
Collins Microflat Black Granite Layout Plate in use

According to the manufacturer, the layout plate is non-rusting, non-warping, non-deflecting, easily washable, smooth, temperature inert, rigid overall, and moisture repellent. The plate is said to require no oiling, and, if nicked, the surface accuracy is not impaired as the surface will not rise around the nick. The layout plate is available in sizes ranging from 12 x 18 inches to 36 x 48 inches.

"OLIVER"

18-in. Metal Cutting

Band Saw



For sawing tubing, small rods, sheet metals, hard rubber, compositions. Also wood.

High speed motor or with low speed geared head motor direct connected to lower wheel.

Cuts straight, circles, curves. Finest Band Saw of its capacity ever built.

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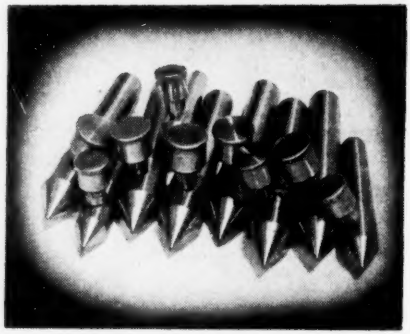
Internally Lubricated Center Is Designed for Lathes and Grinders

An Oil Jet Center for lathes and grinders has been developed by Tool Service, P. O. Box 10265, 3316 San Pedro St., Tampa 9, Fla. The center features forced internal lubrication, whereby lubricant is stored in a grease cup and supplied to the workpiece through a tiny jet in the center point of the center. According to the manufacturer, the grease cup can be replaced with a grease-gun fitting for use with a grease gun where lack of space makes it desirable.



Oil Jet Centers

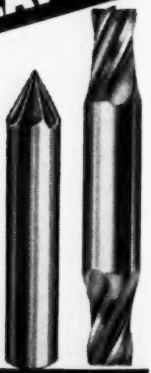
The center is supplied with the 60-degree point, tipped over the full length with either high-speed steel or a wear and heat-resisting cast alloy. The center is accurately ground, and the shank is made of unhardened tool steel. The grease cup is available with either seals or fitted threads to prevent leakage. The Oil Jet Center is available in Morse and B&S tapers; however, other tapers and straight shanks can also be supplied.

Tiny Parts Cabinet Features Two Drawers in a One-Piece Welded Press

Precision Equipment Co., 3714 Milwaukee Ave., Chicago 41, Ill., has announced an all-steel tiny parts cabinet, designated as the "Little Gem," which consists of two 1½-inch high drawers in a rugged one-piece welded frame and which is designed for use in industrial plants, school shops, garages, and so on. The unit has

RAYMAC

Solid Carbide END MILLS and CENTER LAPS



Raymac Solid Carbide end mills and center laps assure you precision workmanship, long tool life and minimum down time, plus the advantages of a specific tool for individual applications.

Write today for complete technical information.

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You Need an Extra Hand Now to Speed Up Production!

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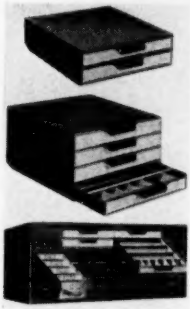
Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. ● URBANA, OHIO

an overall size of 3¼ inches high x 11 inches deep x 11 inches wide, and each drawer is furnished with eight dividers, giving the cabinet a total of 24 adjustable compartments. Extra dividers are said to make possible a total of 56 compartments per unit. Tabs turn up and engage the shelf above to prevent tipping when the cabinet is used as an insert in shelving. Any number



"Little Gem" Tiny Parts Cabinet

of units can be stacked in one solid, rugged assembly.

The cabinet is especially designed for insertion in the company's standard parts cabinet which consists of 18 drawers. The top illustration shows a single Little Gem Cabinet, the middle illustration shows two cabinets stacked, and the lower illustration shows two cabinets substituted for four standard drawers in a standard parts cabinet.

ENGRAVE

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The only one with adjustable copy holding slides for multi-line engraving in one set-up.

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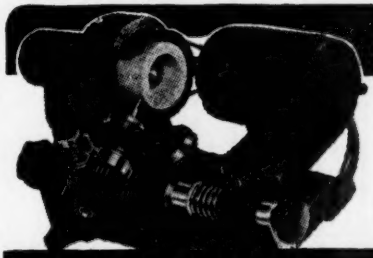
World's Largest Manufacturer of Portable Engraving Machines



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- Vibrationless
- Ball bearing grinding spindle
- Indexed for 1-4 sided cutters

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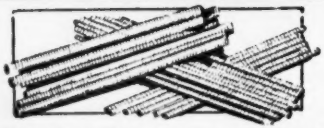
REID
TOOL ROOM ACCESSORIES

COMPRESSION SPRINGS — Music wire. Many sizes and diameters. 10" lengths. Select size. Cut to size desired. Much quicker than winding springs by hand. Low prices.
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HAND KNOBS Cast iron. Three styles. Scalloped, long shank with wrench hexagon and prong types. Smooth finish. Many sizes.
ALSO. Hand wheels, plastic balls, levers, cranks and scores of other needed items. Low prices.
FREE NEW 44 Pg. CAT.
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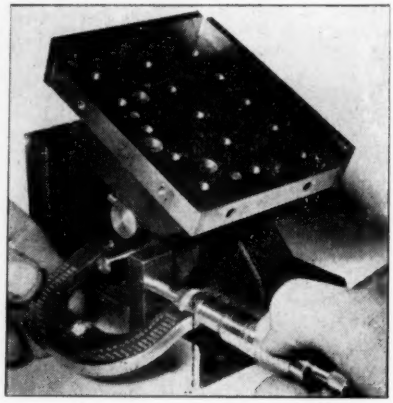
Muskegon Heights, Michigan

Sine Angle Plate Measures Any Angle from 0 to 90 Degrees

Any angle from 0 to 90 degrees, it is claimed, can be set or measured quickly and accurately by use of the Bemisine Angle Plate manufactured by Mutual Machine Co., 8 Loring St., Hudson, Mass. According to the manufacturer, all that is required for use with the device is a 2-inch micrometer. The unit is a drilled and tapped plate of oil-hardening tool steel mounted pivotally in a right-angle cast-steel base. A measuring pin is located in the pivotal assembly, and a



Bemisine Angle Plate

measuring block is fixed in the base. Measurement by micrometer over the pin and the block is said to provide sine readings in true relationship to the angular position of the plate.

For setting an angle, the plate is initially set in position and held by means of a sensitive knurled knob. When the proper micrometer measurement has been verified, the plate is locked with a standard hex wrench. The unit, it is claimed, can be used for holding workpieces for drilling, light milling, jig boring, and grinding operations, as well as for inspection purposes.

Vernier Caliper Is Made of Stainless Steel

Designated as the Mauser Model No. 101, a universal vernier caliper, for inside outside, and depth measurements, that is

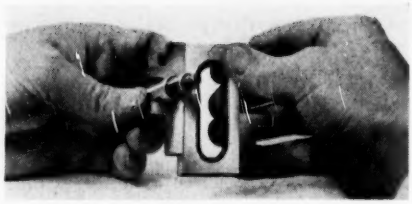
made entirely of stainless steel is now being marketed by George Scherr Co. Inc., 198A Lafayette St., New York 12, N. Y. Said to be rust and tarnish-resistant, the caliper has three scales and verniers to read 1/1000 inch lower front, 1/128 inch and fractions upper front, and 1/10 mm. on the back. The instrument, it is claimed, has 25 lines covering 49 graduations of the scale, and two adjusting screws are provided for taking up any wear and assuring squareness of the measuring jaws. The caliper also features a hardened self-lubricating phosphor bronze spring gib construction for the slide.

Mauser Model No. 101 Universal Vernier Caliper

Snap Gage Offers Wide Range of Adjustment

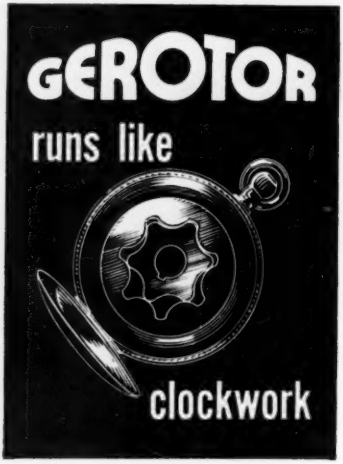
Designated as the "Multi-Gage," a snap gage which is said to offer a wide range of adjustment has been announced by American Standard Co., Plantsville, Conn. In using the gage, the snap jaws are brought together and measured. The combined sizes of the two jaws are then added to the size required and very simply set by using only a micrometer and an Allen wrench. The same principle is employed for measuring holes by using ball point hole gage jaws.

The gage is narrow, compact, and light, thus making it easy to handle. If the gage becomes worn by constant use, the jaws may be removed, given a few rubs on a lapping plate, and reassembled quickly and easily. The Multi-Gage is said to be ideal for the gaging of a hole distance from the edge, gaging wall thickness of tubes, snap gaging concave diameters, gaging the distance between two holes, and many other applications.



American Standard "Multi-Gage" in use

the GEROTOR mechanism runs like clockwork



because it's PRECISION engineered

In every GEROTOR pump, precisely paired gear-shaped elements transmit power from the shaft with high efficiency. These elements, revolving in the same direction at low relative speed, constitute the unique GEROTOR mechanism . . . famed for long life, less wear, less slippage, dependably smooth performance. Gerotor May Corp., Baltimore 3, Md.

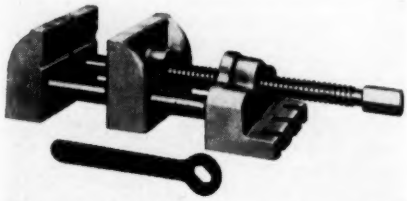
GEROTOR hydraulic pumps

Controlled-Cut Carbide-Tipped Safety Saw

A controlled-cut carbide-tipped safety saw which, it is claimed, will not grab workpieces and, consequently, will not kick back at the operator has been added to the "Meyco" line of circular saws marketed by W. F. Meyers Co., Inc., Bedford, Ind. According to the manufacturer, the safety saw provides for economy because of fewer teeth, long life between grinds, and smooth cuts which often make additional finishing unnecessary.

Drill Press and Machine Vise Is Built to Close Tolerances

Available in jaw widths of 3, 4½, and 6 inches, a drill press and machine vise which is built to close tolerances and which features simple design to elimin-



Wilton 6-Inch Drill Press and Machine Vise

ate "dead weight" has been announced by Wilton Tool Mfg. Co., 925-941 Wrightwood Ave., Chicago 14, Ill. The vise is fitted with a precision-cut Acme spindle, and all main parts are cast of high-grade grey iron. According to the manufacturer, the vise may be used flat or on either side, eliminating the need to remove the workpiece. The jaws have vertical and horizontal V-grooves for clamping rounds.

Two slide bars, constructed of heavy-gauge cold-rolled steel, are said to provide extreme strength and smooth travel. Removable hardened-steel jaw plates can be supplied as extra equipment. The vise is available in two models; namely, a 6-inch model with a removable crank handle and a 4½-inch model which incorporates a slide bar handle in addition to a hex-head for wrench tightening.

Tool Post Turret Provides Repetitive Indexing to Plus or Minus 0.0003 Inch

Designated as the "Wedge-Lock," a tool post turret which is said to provide repetitive indexing in all 12 positions to plus or minus 0.0003 inch within itself by means of hardened steel crown gear tooth clutch plates has been announced by Olson Industrial Products, Inc., 40 W. Water St., Wakefield, Mass. Designed for use on engine, bench, and turret lathes for boring, turning, and facing operations, the unit features a turret body which, it is claimed, does not raise

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All-purpose magnifier for general shop use

Large 2X double convex precision ground lens folds into durable protective leather case. A popular, inexpensive model to carry or keep in desk or on bench. Only $1. See complete line of industrial magnifiers by this manufacturer, world-famous for optical quality and value. Stocked by leading industrial suppliers, $1 to $25. Bausch & Lomb Optical Co., 50519 Bausch St., Rochester 2, New York.

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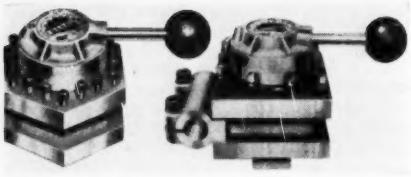
Industrial Magnifiers



Olson "Wedge-Lock" 6-Way and 4-Way Block Turrets

up when indexing, thus preventing chips and other foreign matter from falling between the head and its seat.

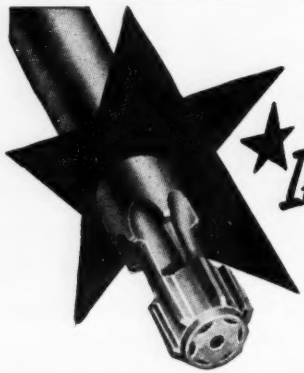
A splined handle is said to allow the operator to position the turret easily and quickly to his best advantage. The turret is made in a 4-way block and a 6-way block model.

Micrometer Gage Accurately Measures Chamfers up to 1 Inch

A chamfer micrometer gage which is designed to accurately measure end diameters of chamfers up to 1 inch from 0-degree chamfer to 90-degree included angle maximum chamfer has been announced by Acme Industrial Co., 212 N. Laflin St., Chicago 7, Ill. According to the manufacturer, the depth of chamfer in a hole can also be easily computed. The gage is a direct reading micrometer and can be read like any standard micrometer.

Acme Chamfer Micrometer Gage in use

A master check bar with a known indicated end diameter and chamfer is furnished with the gage for checking the calibrations of the micrometer. Each gage is individually packaged in a protective felt-lined varnished wood case.



Star Performer In The Reamer Field

Staples

CARBIDE-TIPPED

SHELL TYPE EXPANSION REAMER*

For maximum tool life with minimum tool servicing, put this Staples Shell Type Expansion Reamer on the job. Tool is returned to original diameter simply by driving the shell up the tapered arbor. Tool can be expanded many times without a re-grind. To obtain a new tool, just order a new shell—a standard stock item.

Standardize on Staples Carbide-Tipped Circular Cutting Tools. You'll get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the *quality* name in carbide tool production. You'll save money in the *long* run with Staples.

* Patented

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

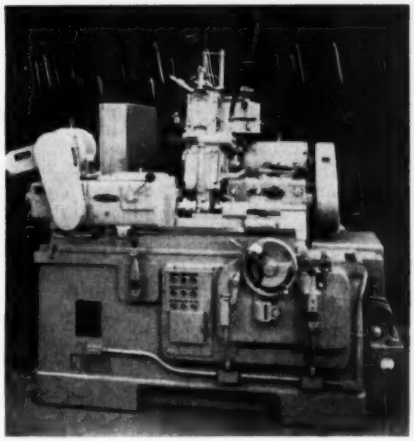
Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers Special Tools

Machine Is Designed for Grinding Elliptical Automotive and Aircraft-Type Pistons

A 6 x 8-inch semi-automatic piston grinding machine which is designed for grinding elliptical automotive and aircraft-type pistons to fine limits of size and finish has been announced by Norton Co., Worcester 6, Mass. According to the manufacturer, the grinder can be specially arranged for grinding complex skirts where the degree of relief varies from the top to the bottom of the skirt. The machine is a heavily-built plunge grinder with a wheel spindle unit and a cam-generating mechanism. This mechanism affords the special motion to the workpiece for grinding the required skirt form. Fast, precision action is said to be obtained from a hydraulically-actuated "revolving feed screw" wheel feed mechanism which provides hydraulic features for rapidly traversing the wheel head and mechanical micrometer screw feed during the grinding feed stage.

Wheel truing is performed automatically by a wheel-guard type truing device with push-button control. The automatic grinding cycle is actuated by the movement of a single lever. For speeding setup and operation, all controls for feeds and speeds are grouped at the operating position on front of the machine. All pumps, motors, relief valves, and flow control



Norton 6 x 8-Inch Semi-automatic Piston Grinding Machine

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INTERESTING PROPOSITION FOR DEALERS EVERYWHERE

valves are mounted in accessible locations on the outside of the machine, and electrical controls are compactly grouped in an elevated enclosure.

Milling Cutter Features Attached Blade

An "attached-blade" type milling cutter which is said to combine the advantages of the solid body and inserted tooth type cutters by providing a replaceable blade with maximum tooth rigidity or minimum tooth deflection has been announced by Millit, Inc., 55 Flint St., Rochester 8, N. Y. The rigidity, it is claimed, is obtained by seating the replaceable blade on the periphery of the cutter body against a body abutment that takes all cutting forces. The blades are accurately doweled in place at two points. A cap screw shank dowels into a reamed hole to locate the blade and combines with the conical seat to accurately cam the blade against the body abutment. A dowel through the body abutment is said to hold a slot in the tail of the blade and accurately locate the tail laterally.

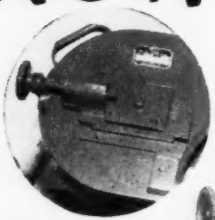
Rake and shear angles are built into the blade instead of being built into the body slot; thus, the body can be rebladed for all types of service. A change from stagger-tooth construction to side-mill construction can be accomplished by a quick change of blades. Also, in changing from cutting steel to cutting cast iron or aluminum, proper rake angle can be obtained by a change of blades.

The blades are available with carbide, high-speed steel, or cast alloy tips, each with proper rake angles built in. The body is made of alloy steel, heat treated for roughness and long life.

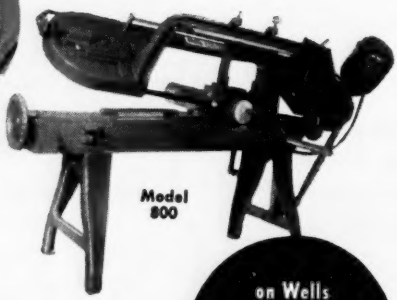
Millit "Attached-Blade" Type Milling Cutter

NOW

Wells offers you fool-proof blade tensioning . . .



Above is a close-up of the new Wells blade tensioning device.



Model 800

on Wells No. 5, No. 8, No. 12 and Model 800 cut-off saws

NOW IT IS POSSIBLE to maintain a constant blade tension on Wells cut-off saws. You can replace or change the blade any number of times, yet quickly and easily duplicate the correct blade tension. The new device is standard equipment on the models listed above. Simply turn the tension hand wheel until the fixed and moving indices coincide. At this point the blade tension is correct regardless of variation in blade length.

Wells SAWS

Wells

Products by Wells are Practical

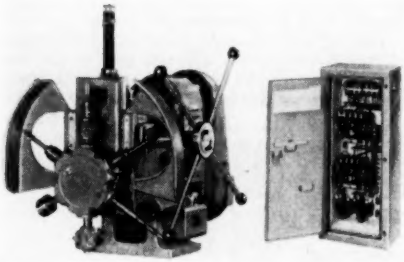
METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

808 TYLER ST. - THREE RIVERS, MICH.

Flange-Type Turret Drill Can Be Mounted on Practically Any Type Base

Designated as the Burgmaster Flange-Type Model 2B, a turret drill which can



Burgmaster Model 2B Flange-Type Six-Spindle Turret Drill with electrical panel

be mounted on practically any type of base in a variety of positions and which is designed so that two or more machines can be mounted on the same base at different angles in order that operations can be performed on different planes at the same time has been announced by Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Calif. The machine is equipped with a separate-mounting electrical panel and chain counterweight unit and can be supplied with an automatic hydraulic feed on special order.

The Model 2B features an 8-inch spindle travel, 12 preselected spindle speeds (225 to 3,000 r.p.m.), and four speeds per spindle. The machine also has a 12-inch throat depth, and the maximum clearance from the nose of a No. 34B chuck to the bottom of the mounting flange is 8¾ inches. The center of the spindle to the first mounting flange measures 12¾ inches, and the size of the mounting flange is 15 x 12 inches. The machine measures 32⅜ inches high x 40½ inches wide x 15 inches deep overall.

Redesigned Standard Cemented Carbide Twist Drill Blanks

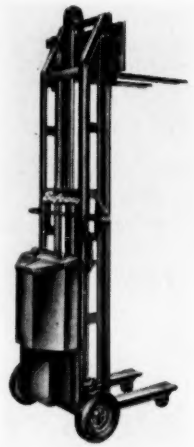
Redesigned standard cemented carbide twist drill blanks which, it is claimed, improve twist drill performance have been announced by Carboloy Department of General Electric Co., 11143 E. 8 Mile

Blvd., Detroit 32, Mich. The reduced thickness dimensions of the redesigned blanks are said to enable drill manufacturers to strengthen the point of each drill, providing more steel backing for the tip. The new blanks are now available in five sizes, TD-1 through TD-5.

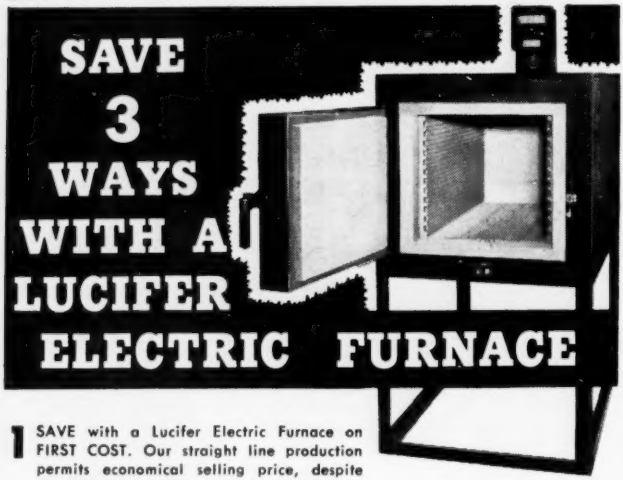
Portable Lift Truck Is Designed for Maximum Safety

Safeway Industrial Equipment Corp., 184 N. Franklin St., Chicago 6, Ill., has announced a powerful, portable lift truck which is designed for maximum safety with one-man operation. The unit is available in three sizes with lifting heights of 68, 80, and 100 inches and has a lifting rating of 1,250 lb. A powerful hydraulic system is utilized, powered by an automotive-type battery which is equipped with a built-in charger with automatic cut-off and trickle charge.

The truck incorporates an electronic switch which cuts off the power at the maximum height and prevents jarring the load and damaging of the hydraulic system. A hand-operated brake which, it is claimed, will prevent movement of the truck when loading and unloading and which will brake the truck when traveling up and down inclines is also provided. The truck is of the fork-lift type; however, if desired, it can be readily equipped with a snap-on platform, thus making it an all-around combination lift truck.



Safeway Portable Lift Truck



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Furnace Size	2000°	2300°
6x 6x12"	$467.00	$548.00
9x 9x18"	647.50	764.00
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Complete with 100% automatic electronic controls.

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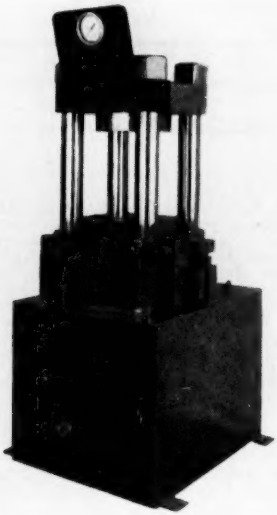
Successors to Gilbert S. Simonski Company

Press Utilizes Complete Hydraulic Circuit

Designated as the Model No. 500H, a 500-ton hydraulic press which features a modern self-contained hobbing press design and which utilizes a complete hydraulic circuit, thus eliminating two-hand control, has been announced by Clifton Hydraulic Press Co., 287-293 Allwood Rd., Clifton, N. J. The hydraulic circuit controls both pumps of the press. According to the manufacturer, the press affords rapid advance with automatic



Clifton Model No. 500H Hobbing Press

change-over to slow pressing speed at full load. No piping, it is claimed, is used in the circuit, eliminating the danger of bursting high pressure lines. The press is available with push-back cylinders for power in both directions as optional equipment.

New Diamond Wheel Backing Increases Wheel Life

Diamond Tool Research Co., Inc., 305 E. 45th St., New York 17, N. Y., has announced a new backing for its straight periphery diamond wheels. Although the formula is a trade secret, it is known that a high aluminum powder content in the

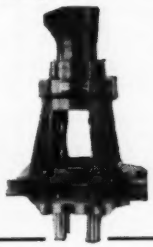
Only

THRIFTMASTER *Universal Joint Type* DRILL HEADS

have these exclusive* features

*Standard Full Ball Bearing Construction, including Spindles

Driving assembly is *Full Ball Bearing* mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

6 Standard Models . . .

Models U-608 and U-1000—Ball Bearing

Models U-620B and U-1012B—Plain Bearing, 11/16" or 1/2" min. centers

Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindle

Semi-Standard Heavy Duty Full Ball Bearing . . .

1/2" in Cast Iron—1-7/16" min. centers 7-1/8" or 9-3/4" D.

1/2" in Steel—1-13/16" min. centers 7" or 9-5/8" D.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

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Subsidiary of Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1034 N. PLUM STREET LANCASTER, PA.

Also Makers of

DORMAN AUTOMATIC REVERSE TAPPERS

plastic back provides excellent heat conductivity, thus affording fast, cool cutting and long wheel life. According to the manufacturer, even the large 10-inch diameter wheel runs true without the uneven distortion frequently induced in this type wheel by harmonic vibrations. All straight wheels now being supplied by the company feature the new backing.

Broaches for Special Applications

The duMont Corp., Greenfield, Mass., has announced that it is now able to supply a wide range of special broaches for special purposes. These special broaches are limited to those having cutting sections of 20 inches or less, overall length of 36 inches or less, and square broaches not smaller than ¼ inch across flats. Round broaches, spline broaches, rifling broaches, and broaches having irregular shapes are not included in this category.

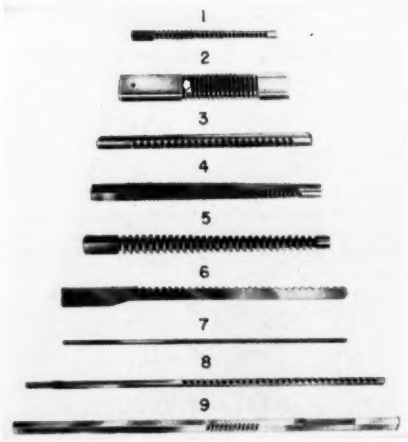

Illustration showing several typical designs of duMont Special Broaches: (1) push-type square broach with round pilot; (2) push-type broach for sizing four sides of rectangular hole in one operation; (3) push-type self-supporting production keyway broach for single-pass operation; (4) push-type broach for squaring both ends of elongated hole in one operation; (5) push-type square broach with round pilot; (6) keyway broach for use in Davis and similar type keyseating machines; (7) pull-type single-pass keyway broach; (8) pull-type single-pass keyway broach; and (9) pull-type broach for sizing width and depth of slot in one operation

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VERNIER CALIPER
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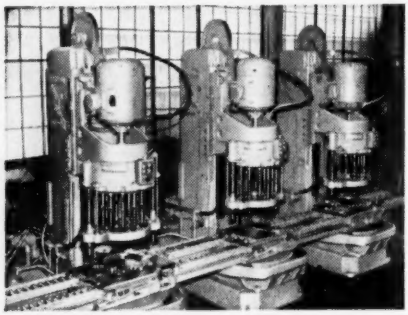
$14.75 PPD
AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED
• SPECIALLY LONG VERNIER to read thousandths
• HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
• 2 GRADUATIONS - 1/1000" - 1/128" - 1/10 mm in back
Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Steads.
GEO. SCHERR CO., Inc. 200-MM Lafayette St., N.Y. 12



No. S. O. 4132: 3-Column Hydraulic Drilling Counterboring and Taper Reaming Machine equipped with 3 25-H.P. Standard "Drillmasters." Attached to each Column is a 14-Spindle Head with tooling to suit successive operations. Fixtures are moved from station to station on a roller type conveyor. **PART:** Sprocket. **OPERATIONS:** Drill, Counterbore and Taper Ream Holes.

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U.S.A. Sales Representative, Arnold J. Werner Co., New Center Bldg., Detroit 2, Michigan

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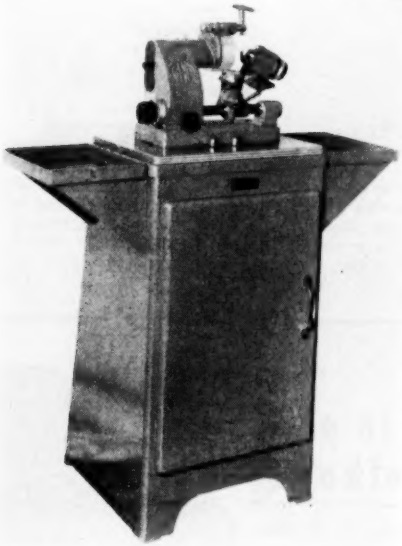
Single-Lip Cutter Grinder Has Universal Head

The Alexander Single-Lip Cutter Grinder which is designed to grind predetermined angles, radii, and off-set radii on high-speed steel, super high-speed steel, and carbide-tipped tools is now being marketed by J. Arthur Deakin & Son, 150-28 Hillside Ave., Jamaica, Long Island, N. Y. The grinder incorporates a universal head, cross slide, and micrometer adjustments for feeds and



Alexander Cabinet-Type Single-Lip Cutter Grinder

chip clearance. The adjustable grinding arm utilizes a graduated tilting support and graduated collar for vertical or horizontal movements of cutters or styli.

The machine is available in cabinet or bench types, each type having a built-in diamond dressing device for dressing the face of the grinding wheel.

Single-Spindle Automatic Chucking Machine Designed for High Efficiency Operation

Designated as the 2-AC, a single-spindle automatic chucking machine which is designed for high efficiency operation in

read what users say

about CMD anti-scoring lubricant

Among technical men all over the country, CMD has become the standard for extreme pressure, anti-scoring lubrication. These men have found that they can get more efficient lubrication for a longer time . . . and get longer life out of their equipment too. People who have used and tested CMD are your best proof of its reliability.

"We have tried out your CMD Anti-Scoring lubricants in both grease and oil in comparison with another brand claiming to be the world's best, for the purpose. We are happy to report that we have found your product superior in remaining in its protective position under sustained heavy loads for the longest periods of time of any material we have tried for this purpose."

Engineering Consultant

"Some time ago you very kindly sent to us some samples of your CMD Center Point Lubricants. These have been carefully tested in a number of applications besides the lubricating of centers, and we are pleased to say that the results have been very satisfactory even in cases where other well known high pressure lubricants have failed in a very short time."

University Dept. of Physics

Sample Kit Available for Your Trial

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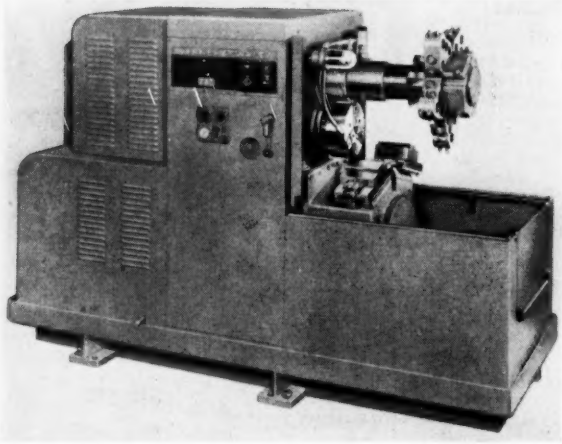


Warner & Swasey 2-AC Single-Spindle Automatic Chucking Machine

diversified production has been announced by The Warner & Swasey Co., Cleveland 3, Ohio. The machine features front and rear cross slides and a five-faced overhead turret, and handles work up to 10½ inches in diameter and up to 9 inches in turned length. Trip blocks, it is claimed, can be easily positioned in the slots of a pentagonal drum at the rear of the turret shaft to control feeds, spindle speeds, length of cutting stroke, and skip indexing. Either or both cross slides can be selected to operate with any or all turret faces, and a quick Allen-wrench adjustment controls late and dwell cross-slide operation.

Set-up controls include feed and speed selectors; automatic and hand operation switches; and forward, reverse, and index push buttons. Operating controls include spindle and coolant control switches; and cycle start, motor start, and stop push buttons. A 15-h.p. 1,660-r.p.m. (full

Bringing you Modern developments in plating processes and methods

HERE are the basic theories and principles of electroplating—the practical methods and processes that are of invaluable use to everyone concerned with electroplating and electrotyping. The most efficient methods of making electrodeposits on more than 40 different metals, alloys, and plastics are summarized completely in this thoroughly revised and enlarged book.

Principles of ELECTROPLATING & ELECTROFORMING

By William Blum, Chemist, U. S. Bureau of Standards and George B. Hogaboom, Consultant

Revised 3rd Edition
455 pages, 6 x 9
24 tables, illus.
$7.00.

Completely revised to make it a more practical working guide, this book summarizes and digests the best of modern practice in the field. It covers qualitative, quantitative analyses of solutions; pickling, dipping; electropolishing; electroforming, electrotyping; producing phonograph record matrices, and manufacturing tubes, etc. Metals are dealt with in the same order as in the periodic system of elements.

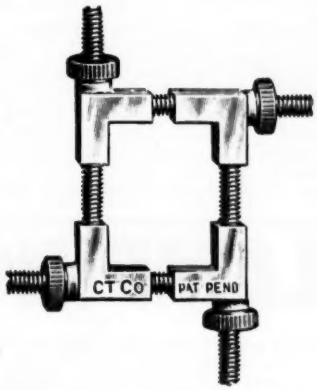
(Please send check with order)

PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio

load) reversing motor is utilized. The machine is said to have a spindle speed range or from 40 to 1,102 r.p.m., and six automatically-selected speeds are available in either of two ranges. Thirty-six feeds are afforded, from 0.0019 to 0.124 inch, from which six may be automatically selected. According to the manufacturer, either or both of the 8-inch wide cross slides can be operated with any of the turret faces, feeding at the same rate. Maximum slide travel of 4½ inches.

Miter Clamp Prevents Marring of Workpieces

Designated as the Hargrave No. 780, a miter clamp which is said to clamp all



Hargrave No. 780 Miter Clamp

four corners of a workpiece at one time and which does not mar the workpiece has been announced by The Cincinnati Tool Co., 1947 Waverly Ave., Cincinnati 12, Ohio. According to the manufacturer, the clamp is unusually flexible as to capacity, quickly adjustable to any square or rectangle within its maximum opening, accurate, and holds firmly until released.

Corner blocks of the clamp are made of strong aluminum alloy, and the screws are ¼ inch in diameter and are made of steel. The adjusting nuts, it is claimed, can be quickly twirled to position and are shaped to provide a good grip for tightening. The clamp is available in four sizes with 8, 12, 18, and 24-inch maximum openings. The minimum opening for all sizes is 2 inches.

NUMBERALL
CUTS THE COST OF STAMPING NUMBERS

Model 70

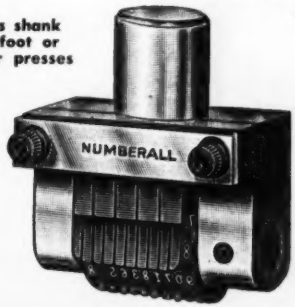
Hand shank

Multi-Wheel Numbering Machine

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Write for Bulletin MS-70

Press shank for foot or power presses



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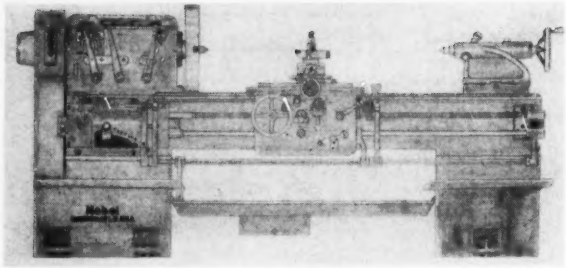

Wash drawing of Nebel Modified 16-Inch "LN" Series Engine Lathe

Modified Engine Lathe Features Quick-Change Gearbox

The Nebel Machine Tool Co., Cincinnati 25, Ohio, has announced the modification of its "LN" Series engine and removable block gap lathes. The modified lathe is a rated 16-inch swing size and features a quick-change gearbox instead of the semi-quick type used in the old series. According to the manufacturer, the standard box offers 30 feed and 28 thread changes, and a quick-change gearbox with 20/40 compounding gears offers 48 feed and 46 thread changes.

The modified lathe incorporates a heavier apron and carriage and is arranged for a 5 to 7½-h.p. main drive motor, single or two-speed. With a two-speed 900/1800 r.p.m. motor, a maximum spindle speed of 750 r.p.m. is said to be attained. The lathe also has cabinet-type legs and a new end cover conforming to the contour of the headstock and quick-change gearbox lines.

Ratchet Wrench Drops Over Stud and Ratchets the Fitting

Identified as the "Life Saver," a hollow-headed ratchet wrench which, it is claimed, will drop over any length stud or rod and ratchet the fitting is now being marketed by Tubing Appliance Co., 10321 Anza Ave., Los Angeles 45, Calif. According to the manufacturer, the wrench provides for exceptional ease in

SAFE, RIGID CLAMPING

. . . CUTS SET-UP TIME IN HALF!

Pat. Pend.

WITHOUT BLOCKS OR SHIMS, these revolutionary "universal-action" clamps of bowed arm design and forged construction provide absolute rigid clamping that *won't work loose!* No corrugations or serrations to wear down and allow slippage. UNIVERSAL Clamps quickly adapt to all T-slot work tables, punch and drill presses, mills, etc.

LOW COST, fool-proof clamps increase machine output up to 50%! Work pieces from paper thinness to 7½" are quickly clamped. Work-holding foot in horizontal position firmly grips narrow ledges or steps . . . also round bar stock in V-blocks. Available in "production" and "tool room" models. Unconditionally guaranteed.

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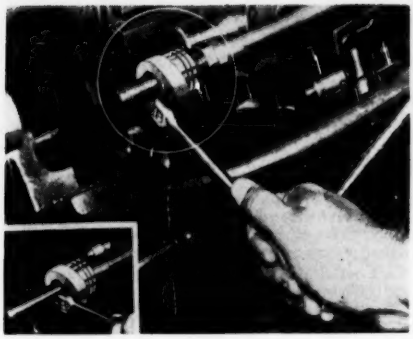


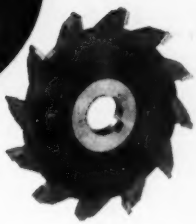
"Life Saver" Ratcheting Socket Wrench in use

close quarters and ratchets accurately in as small as a 7-degree arc. Equipped for square drive handle, the head will accommodate a regular torque handle, and the ratcheting mechanism, it is claimed, will withstand high torquing loads.

The wrench is available in four sets with snap-in sockets to accommodate a total range of hex nut sizes from 0.375 to 2.125 inches.

"It says: 'This tale of pathos and despair will be continued next week.'"

Try MILLIT and get



1 **PERFORMANCE:** Millit *blade rigidity* gives top performance —cuts longer between grinds —less carbide breakage—will take deepest and heaviest cuts.

2 **VERSATILITY:** Rake angles are *built into* the replaceable blades—same body can be rebladed for all types of service with H.S.S., Cast Alloy, or Carbide Tips.

3 **PRICE:** Millit *design simplicity* allows a replaceable blade cutter at prices lower than ever before.

4 **DELIVERY:** Production capacity has been geared to provide continuing *favorable deliveries.* Let us quote on your special cutter requirements from 4" to 14" diameter.

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DISCOVER THE ADVANTAGES OF MILLIT

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NEW SHOP LITERATURE

Gage Care. For posting in inspection departments or laboratories, Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill., has published a reprint of an advertisement entitled "Make Gages Last Longer." Offered as a service to gage users, the reprint points out seven ways gages should not be handled and four very important reminders that contribute to longer gage life. The reprint is printed in three colors on heavy-coated stock and measures 8⅜ x 11¼ inches.

Hole Finishing Equipment. Barnes Drill Co., Rockford, Ill., has released a 20-page two-color booklet which traces the development of its drilling and tapping machines; special unit and transfer machines; honing machines, tools, and abrasives; magnetic separators and filters; and chip conveyors. Illustrations and a short editorial on B. F. Barnes, founder of the company, are included.

Cutters. A six-page two-color catalog released by Aber Engineering Works, Waterford, Wis., fully describes and illustrates its line of curved tooth side milling cutters, overlapping side milling cutters, Woodruff keyway cutters, plain milling cutters, and shearing-action milling cutters. Complete specifications and price lists are included.

Stainless Steel Measuring Instruments. A 37-page illustrated catalog released by Alina Corp., 401 Broadway, New York 13, N. Y., fully describes Etalon Swiss-made stainless steel measuring instruments. Detailed instructions on measurement with the vernier caliper and a handy chart showing decimal and millimeter equivalents of fractional parts of an inch are included.

High Speed Slotting of Machine Screws. Van Straaten Chemical Co., 546 W. Washington Blvd., Chicago 6, Ill., has released a field research engineering report (No. 40) containing performance data on a new oil compound which is said to increase the efficiency of high speed slotting operations.

Sine-Line Lead and Axial Pitch Checker. A four-page two-color illustrated brochure (No. 48-53), covering the Michigan Model 1248 Sine-Line Lead and Axial Pitch Checker designed for checking large spur, helical, and herringbone gears up to 48 inches in diameter, has been released by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The use of the machine with a recorder, gear capacities, and the use of either manual or power drive are discussed in the brochure. Important features of machine design and operation, as well as specifications, are provided.

For Your Convenience . . .

the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 384, 386, 388 and 390.)

MODERN MACHINE SHOP

431 MAIN STREET • CINCINNATI 2, OHIO

Internal Grooving Tool. A 20-page illustrated catalog (No. gt 2-53) released by Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y., fully describes the Waldes Truarc Grooving Tool which is designed for the cutting of internal concentric recesses. Information on special features, modifications, and adaptations of the tool; charts describing various cutters; diagrams and instructions on the setup of the tool; case histories; and data on how to select the right tool and the right accessories for a particular job are included in the catalog.

Marking Devices and Equipment. Newark Stamp & Die Works, 203-205 Market St., Newark 2, N. J., has issued a 20-page two-color catalog illustrating and describing its line of marking devices and equipment. Information on coining dies, embossing dies, high-speed profiling, machine engraving, marking machines, mold engraving, press stamping dies, reverse letters and figures, reverse steel stamps, roller dies, rubber etching dies, steel stamps, stencils, symbol stamps, type holders of various kinds, wire making dies, and other marking devices is included.

Electric Furnaces. A four-page illustrated bulletin (No. HD-153) released by Hevi Duty Electric Co., Milwaukee 1, Wis., fully describes its 2,600 deg. F. electric furnaces which utilize silicon-carbide heating elements. Specifications are included in the bulletin.

Soluble Oil. A four-page three-color bulletin (No. SS-SO53) released by Shear-Speed Chemical Products, 7125 E. McNichols Rd., Detroit 12, Mich., fully describes "Shear-Speed" Soluble Oil which is a multi-viscosity blend designed for a wide range of applications. Illustrations of typical applications and information on cost-cutting features are included.

Portable Pantograph Engraver. An eight-page two-color catalog (No. 53) released by Mico Instrument Co., 76 Trowbridge St., Cambridge 38, Mass., fully illustrates and describes its portable pantograph engraver which is designed for two and three-dimensional engraving and precision duplicating operations. Data on many component and accessory parts, including the various styles of master type, and specifications are provided. A price list is included.

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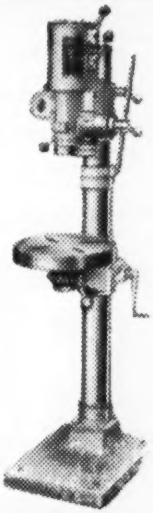

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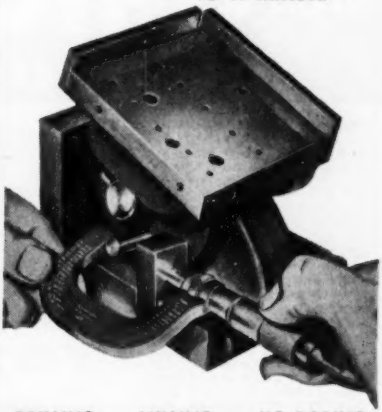


DRILLING — MILLING — JIG BORING
GRINDING — INSPECTION
Write for Bulletin
Mutual Machine Co., Hudson, Mass.

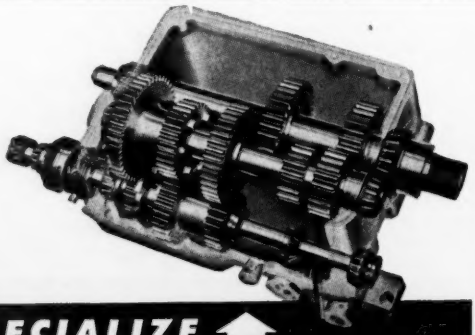
Profile Tracing Attachment. A four-page two-color catalog issued by Air Control Division, Lehigh Foundries, Inc., 1500 Lehigh Drive, Easton, Pa., describes and illustrates the "Pro-Tracer" Profile Tracing Attachment which is designed for use on any engine lathe. Information on various applications is included in the catalog.

Reciprocating Gear Grinding Machine. An eight-page two-color catalog (No. GG-52) issued by The Sheffield Corp., Dayton 1, Ohio, describes and illustrates its Model 140 Reciprocating Gear Grinding Machine for the production of precision-ground helical and spur gears. Specifications, data on features, and line drawings are included.

Horn-Type Power Presses. A 16-page three-color bulletin (No. 223) released by Clearing Machine Corp., 6493 W. 65th St., Chicago 38, Ill., fully describes and illustrates its line of horn-type power presses. Complete information on features, dimensional drawings, specifications, and cutaway drawings are included.

Ten-Inch Lathes. South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., has released a six-page two-color bulletin (No. 5303CD) fully describing and illustrating its line of 10-inch lathes which are available in both bench and floor types. Information on attachments and accessories, as well as complete specifications, is included.

Machine Tools and Accessories. A 180-page two-color bulletin released by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., fully describes and illustrates its used and rebuilt machine tools; domestic and foreign machine tools; tools for turret lathes; engineering service; rebuilding service; and plant liquidations. Complete specifications of each machine, as well as dimensional drawings, are included. The bulletin is indexed for easy use.



This special gear unit was designed and manufactured per customers requirements.

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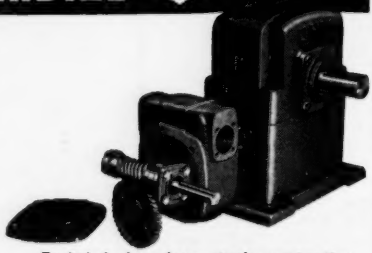

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REDUCE MAINTENANCE AND MANUFACTURING COSTS — standardize with OHIO GEAR stock gears and stock speed reducers for years and years of dependable rugged trouble-free service.

NEW METHODS — modern machinery, sound engineering, approved and thoroughly tested materials enable our Distributors and Representatives to give you prompt, intelligent and helpful attention. Call him or write direct.

Exploded view shows sturdy construction of catalog number DHS Series Reducers.

ESTABLISHED 1915

THE OHIO GEAR COMPANY
1308 E. 179 St., Cleveland 10, O.

OHIO GEARS

Radial Drills. A 16-page two-color bulletin featuring Morris 11-Inch Column Mor-Speed Radial Drills has been published by Morris Machine Tool Co., 934 Harriet St., Cincinnati 3, Ohio. Individual sections of the bulletin are devoted to information on centralized controls, wide range of speeds and feeds, precision spindle and spindle sleeve assembly, automatic locking-elevating mechanism, extra-strength arm, head and head clamp, and accessories. Foundation plans, dimensions, and specifications of the 11-inch column, 3, 4, 5, and 6-foot arm radial drills are included.

Set-Up Appliances. An eight-page two-color bulletin released by Standard Shop Equipment Co., 82nd & Tinicum Ave., Philadelphia 42, Pa., describes and illustrates its set-up appliances, including bolts, nuts, washers, studs, step blocks, packing blocks, U-clamps, double-end clamps, jacks, and wedges. Complete specifications and prices are included.

Rotary Stock Stops, Floating Holders, Tap Holders, and Hinged Shoe Bushing Blanks. A four-page two-color catalog issued by Barnaby Mfg. Co., Inc., 74 Knowlton St., Bridgeport 8, Conn., describes and illustrates its line of rotary stock stops, chuck-type floating holders, conventional floating holders, non-releasing tap holders, and hinged-shoe bushing blanks. Information on sizes, dimensions, and prices is included.

Cemented Chrome Carbide. A technical report (No. CC-100) on Carboloy Grade 608 Cemented Chrome Carbide, a comparatively new powdered metal that is highly resistant to corrosion and erosion, has been issued by the Carboloy Department of General Electric Co., 11143 E. 8 Mile Blvd., Detroit 32, Mich. The report includes data on composition, manufacture, physical properties, application suggestions, finishing techniques, methods of attachment, and background material on the Carboloy Department.

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Hydraulic Presses. A 40-page two-color bulletin (No. 10) released by Clifton Hydraulic Press Co., 287-293 Allwood Rd., Clifton, N. J., fully describes and illustrates its line of hydraulic presses. The bulletin is designed to assist in the correct selection of a hydraulic press to meet individual requirements. Line drawings, engineering tables, and specifications are included.

Centers and Other Machine Tools. Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., has issued a 1953 edition of its pocket-size catalog of Red-E centers and other machine tools, including the Red-E Tap-A-Hammer, ball chains for hardened ways, vise hold-downs, and grinder dogs.

Valves and Cylinders. A four-page three-color bulletin describing the application of air and hydraulic power is being distributed by Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Boston, Mass. The bulletin includes a condensation of the complete Rivett line of over 400 valves and cylinders, as well as a story on the simplicity and economy of these types of power.

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DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

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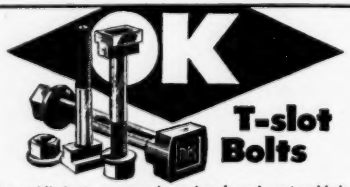
CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave. • Cincinnati, Ohio

Automatic Roll Marker. New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit 7, Mich., has released an illustrated bulletin describing the Model 600-E Automatic Roll Marker which is designed for use on automatic and hand-operated screw machines, lathes, and similar equipment for marking part numbers, patent numbers, trade marks, and so on, on the end faces of parts, sides of gear blanks, and other components. Dimensional drawings, complete set-up and operating instructions, and specifications for ordering are included.

Work Driver. An eight-page two-color catalog published by The Skinner Chuck Co., 210 Edgewood Ave., New Britain, Conn., fully described and illustrates its + GF + Work Driver which can be used for clamping all materials that can be turned between centers. Information on clamping, disengaging, maintenance, and application, as well as complete specifications and dimensional drawings, is included.

Hack and Band Saw Blades. An eight-page two-color general catalog (No. 700) issued by G. W. Griffin Co., Franklin, N. H., describes and illustrates its line of hack and band saw blades. Information on how to select the proper hack saw blade and complete specifications are included.

"Hints on Heat Treating Tool Steel," a four-page illustrated bulletin released by K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 37, Ill., is designed to help small machine, tool, and die shops which do not have trained metallurgists but want to do their own heat treating. Information on hardening, quenching, and drawing or tempering, as well as a heating-time graph, is included.



The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½—$1.36; ⅝—$1.36; ¾—$1.58; ⅞—$1.89. Write for price list.

THE O K TOOL COMPANY, MILFORD 4, NEW HAMPSHIRE

Jig Vise. A four-page two-color bulletin (No. B-100) issued by Suprecision Products, 2447 Nicollet Ave., Minneapolis 4, Minn., describes and illustrates the "Powered-Air" Jig-Vise which incorporates an air control valve as an integral part of the unit. Information on features and applications is included.

Punch Presses. An eight-page three-color catalog issued by Diamond Machine Tool Co., Pico, Calif., fully describes and illustrates the 24, 36, 48, and 60-inch ram size Multi-Max punch presses. Information on new construction features and specifications are provided. Many attachments, such as a shearing die attachment, punch shank adapters, and pneumatic draw die cushions, are also illustrated and described.

Dial Bore Gages. An eight-page two-color bulletin (No. 53) issued by Boice Mfg. Co., Staatsburg, N. Y., fully describes and illustrates its complete line of dial bore gages for detecting bell-mouthed, taper, out-of-round, barrel shaped, and hourglass hole conditions. Complete specifications and gaging tips are included.

Hole Punching Units. A 16-page three-color catalog (No. C) released by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., fully describes and illustrates the Wales Type "C," "E," and "EJ" Punching Units which have been developed especially for punching holes in angles, extrusions, shapes, and sheets. Complete specifications, dimensional drawings, and application data are included.

Precision Rotary Tables. A 12-page two-color bulletin released by Pratt & Whitney, Division Niles - Bement - Pond Co., West Hartford 1, Conn., fully describes and illustrates its line of precision rotary tables which are available in plain, tilting, and vertical types. Information on various applications and complete specifications are included.

Tool Post and Toolholders. Aloris Tool Co., Inc., 80-82 Fourth Ave., New York 3, N. Y., has released a leaflet which fully describes and illustrates its tool post and toolholders which are designed for use on any standard engine lathe. Specifications and a price list are included.

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From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.
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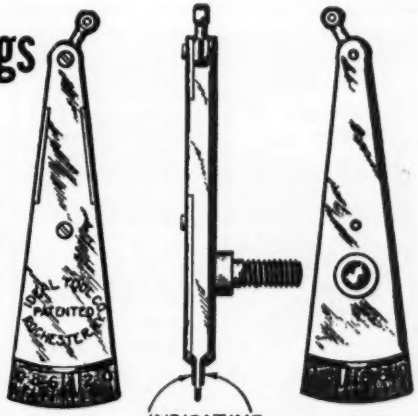

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Precision Lathes, Micro-Drill Presses, and Watchmaker's Tools. A 32-page two-color catalog (No. L) released by Louis Levin & Son., Inc., 782 E. Pico Blvd., Los Angeles 21, Calif., fully describes and illustrates its line of precision lathes, micro-drill presses, and watchmaker's tools. Data on various applications, complete specifications, and dimensional drawings are included.

Carbide-Tipped Milling Cutters. A four-page two-color brochure issued by Millit Division, Kraus Design, Inc., Flint St., Rochester 8, N. Y., describes and illustrates its Class 1000 Carbide-Tipped Plain and Side Milling Cutters. Data on design advantages and specifications are included.

Vises, Rotary Tables, Milling Attachments, and Angle Plates. Chicago Tool & Engineering Co., 8399 S. Chicago Ave., Chicago 17, Ill., has released an eight-page illustrated catalog describing the Palmgren line of production vises, angle vises, drill press vises, swivel machine vises, hand vises, rotary tables, milling attachments, and adjustable angle plates. Specifications and prices are included.

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SAFELY AND FAST
Mecco SAFETY
"WEDGE-GRIP"
STEEL TYPE HOLDER
Fast TYPE CHANGE FEATURE
Ideal for use on marking jobs requiring interchangeable type, this unit features a patented Safety Snap for speed and ease in changing type. Made to order in any size, it is made of Mecco Safety Steel to prevent spalling and mushrooming.
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Mecco SAFETY MARKING TOOLS
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Drills, Reamers, and Special Tools. Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich., has issued a 176-page general catalog (No. 105) on its line of drills, reamers, countersinks, counterbores, carbide tools, tool bits, and special tools. The catalog has visible indexes which indicate each section, and a complete alphabetical and numerical index is included. A technical data section containing information that will prove helpful to those interested in cutting tools is also provided.

Deburring Machines. An illustrated bulletin (No. 2029) released by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 4, Mich., fully describes how the Model 2029 Burr-Master chamfers both toothedges and root of flywheel ring gear teeth with a generated cutting action. Complete details on the machine's automatic operating cycle, performance, construction, and specifications are included.

Simplified Pricing System for Grinding Wheels. The Carborundum Co., Niagara Falls, N. Y., has announced a revised catalog presenting a new simplified pricing system for grinding wheels. The extent of the simplification is indicated by the fact that the previous catalog of 114 pages of list prices, discounts, and so on, has been reduced to 32 pages. According to Carborundum, the purpose of the new system is not to raise or to lower prices but is to simplify the pricing method for grinding wheel users.

Circular Saw Blades. An eight-page two-color bulletin (No. 100-CT) released by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, fully describes and illustrates its line of circular saw blades which are said to provide equal efficiency in cutting off stock or in slitting and slotting operations. Information on automatic blade sharpeners, circular knives and slitters, and soluble oil is also included.

Die Filing Tool. Nord International Corp., P. O. Box 44-N 105, Denville, N. J., has released a circular which describes and illustrates the "Di-Profiler" that combines reciprocating, rotating, and oscillating action for filing, honing, polishing, lapping, chafing, and sawing all materials from carbide bits to wood and fiber. Application data and specifications are included.

Pressure Regulators. An eight-page three-color bulletin (No. 4003) issued by Moore Products Co., H & Lycoming Sts., Philadelphia 24, Pa., fully describes and illustrates the five series of "Nullmatic" Pressure Regulators. Specifications, dimensional drawings, and performance curves are included.

Offset Boring Chucks. A four-page two-color catalog released by Last Word Sales Co., 18500 Mt. Elliot, Detroit 34, Mich., fully describes and illustrates the Samson Offset Boring Chuck which is designed for holding boring bars, drills, end mills, fly tools, and similar tools in milling machines and boring mills of various types. Information on accessories and dimensional drawings are included.

Torque Testing Fixture. A four-page two-color bulletin (No. TTF) released by P. A. Sturtevant Co., Addison, Ill., fully describes and illustrates its torque testing fixture which is available in two models with capacities of from 0 to 200 inch-pounds and 0 to 150 foot-pounds. Information on construction features and applications, as well as complete specifications, is included.

Carbide-Tipped Cutting Tools. An 84-page two-color catalog (No. 53) published by Wendt-Sonis Co., Hannibal, Mo., fully describes and illustrates its line of carbide-tipped cutting tools, including reamers, drills, counterbores, end mills, centers, milling cutters and shell mills, rotary files, solid carbide tools, tool bits, carbide blanks, and diamond files. Selection tables for determining correct carboloy grades and machining speeds, resharpening directions, and other technical data are included. A carbide manufacturers' grade recommendations chart and a complete price list are also provided.

Stainless Steel Bars. A 28-page two-color illustrated bulletin released by Allegheny-Ludlum Steel Corp., Pittsburgh 22, Pa., presents information to aid the user in the selection of the proper stainless steel material for the job at hand. Reference tables on sizes and shapes available, weights, and corrosion resistance are provided. The bulletin also includes an eight-page section of helpful fabrication and processing information, covering cutting, welding, forging, upsetting, machining, drilling, reaming, tapping, threading, turning, milling, annealing, and heat treating.

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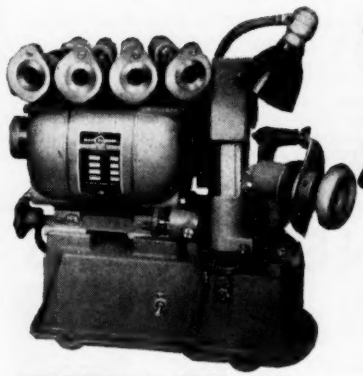

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Black Diamond precision DRILL GRINDER for Sharpening SMALL DRILLS

- Simple—fast—accurate
- Preferred by industry
- Web thinning attachment

Black Diamond SAW & MACHINE WORKS, INC.

NATICK, MASSACHUSETTS

Screw Machine Production Tools. A 58-page two-color catalog (No. 25) released by Empire Tool Co., 8776 Grinnell Ave., Detroit 13, Mich., describes and illustrates its line of cutting-off blades, ground tool bits, live centers, taps, tap holders, toolholders, and tool posts. A list of the names of machines for which blades and holders are available is included. Complete specifications and line drawings are provided.

Precision Surface Grinders. A 20-page two-color catalog released by The DoAll Co., Des Plaines, Ill., fully describes and illustrates its line of precision hydraulic surface grinders for toolroom and production grinding operations. Various attachments, including the combination "cool grinding" and flood coolant attachment, to expand the versatility of the grinders are also described. Information on features and specifications are included.

Surface Roughness Measuring Instrument. An eight-page two-color bulletin (No. LT77) published by Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., fully describes and illustrates the "Profilometer," a direct reading shop instrument for measuring surface roughness height in micro-inch units. Data on practical operating features and on applications are included,

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Air Cylinders. Carter Controls, Inc., 2918 Bernice Rd., Lansing, Ill., has published a four-page two-color bulletin (No. 100) describing and illustrating its complete line of air cylinders. Information on features, dimensions for six standard mounting styles, a complete cross-section diagram and parts list, and a dimensional chart for rod eye and rod clevis are included.

Materials Handling Equipment. A 36-page color catalog (No. 53) issued by Allied Mfg. & Sales Co., 201 N. Wells St., Chicago 6, Ill., covers a wide variety of Grand materials handling equipment and C-clamps. The materials handling equipment described includes two-wheel hydraulic lift hand trucks, fork lift stacker hand trucks, hydraulic material elevators, barrel and tote pan dumpers, portable shop cranes, derricks, and hoists. The catalog is letter-file size and conveniently arranged with color coded tab separators for each equipment classification.

Wheels, Points, Blocks, Sticks, and Cones. A six-page two-color folder issued by Cratex Mfg. Co., 81 Natoma St., San Francisco 5, Calif., includes data on the adaptability, versatility, and application of Cratex Rubberized Abrasives, together with complete specifications and prices. Wheels, points, blocks, sticks, and cones for machine or manual application are fully described and illustrated.

Stud Drivers. A two-color illustrated bulletin (No. 653) issued by Heli-Coil Corp., 1363 Shelter Rock Lane, Danbury, Conn., describes Aero-Thread Stud Drivers and their components, including collets, driver bodies, nose pieces, handles, and so on. Specification tables are provided to aid users in the selection of hand or power models.

Straight Chrome Stainless Steel. A four-page folder issued by The Carpenter Steel Co., Reading, Pa., fully describes the advantages of its Type 443 straight chrome stainless steel. The folder compares the workability and mechanical properties of the Type 443 at room and elevated temperatures with those of Types 304 and 430.

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What's In A Name?

In the year 1928 the name MODERN MACHINE SHOP could have been a reference to any up-to-date shop. However, it was also the name on the mast head of a new magazine. It meant much to a very few people who gave it its birth. It meant little or nothing to the people for whom it was designed. MODERN MACHINE SHOP was just a name.

Today, twenty-five years later, the name MODERN MACHINE SHOP means many important things to many important people.

To thousands of plant men, works managers, master mechanics, chief engineers, and foremen, the name MODERN MACHINE SHOP means a storehouse of useful, practical information . . . a constant source of new ideas to help them with their jobs . . . a market place where hundreds of manufacturers display their products. To these men, MODERN MACHINE SHOP is a "Where To Get It - How To Do It" publication.

To thousands of dealers, salesmen, representatives, and agents MODERN MACHINE SHOP is one of their best selling tools. It helps them get that proverbial "foot in the door" and smoothes their way to a quicker sale.

To hundreds of advertisers, the name MODERN MACHINE SHOP means the most economical method of communicating with the production executives in the huge metal working market. It carries their story to more men in more plants than any other metal working medium.

To a handful of us who edit, produce, circulate, print and sell it, the name MODERN MACHINE SHOP is a source of tremendous pride in a job well done.

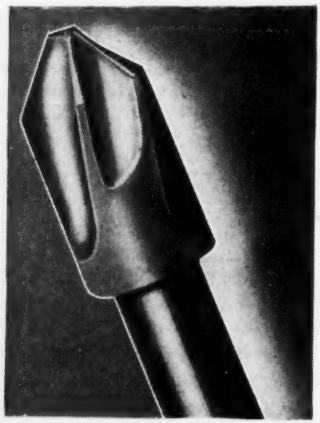
MODERN MACHINE SHOP . . . a name that inspires confidence in all who know it and use it.

Our twenty-fifth anniversary year

"Handbook of Accident Prevention for Business and Industry," released by the National Safety Council, is a convenient safety guide for the manager of a small business or the supervisor of a department in a large organization. The handbook shows how to set up and maintain a safety program. Detailed information is included on subjects such as plant layouts, materials handling, housekeeping, machine guarding, electrical hazards, pressure vessel hazards, first aid, fire prevention, and personal protective equipment. The 94-page handbook is profusely illustrated and contains several check lists. Further information and prices regarding the handbook can be obtained by writing to the National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.

Hand Hack Saws, Power Hack Saws, and Band Saws. The Capewell Mfg. Co., 60 Governor St., Hartford, Conn., has released three information booklets on the selection and use of hand hack saws, power hack saws, and band saws. Each pocket-size booklet is complete in itself. Several of the principal subjects covered in each booklet are how to select the correct blade for the job, and how to insert the blade in the frame or machine, how to tension the blade, how to determine the correct speed and feed, how to position the work, how to detect and eliminate sawing difficulties, check points on machine maintenance, tips on safety, and others. Comprehensive charts and diagrams accompany the descriptive matter on each subject.

SOLD THRU LEADING SUPPLY HOUSES



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Metal-Producing Opportunities in Netherlands. Opportunities for American industry to embark on metal-producing operations in the Netherlands are suggested in a 12-page booklet, released by Netherlands Industrial Institute, Room 48, 1-M, The Biltmore, New York 17, N. Y., which outlines the present status of the Dutch metallurgical industry. Topics include the present scope of activities in blast furnaces, steel rolling mills, steel foundries, forging plants, iron foundries, non-ferrous metal production, rolling and extrusion, and powder metallurgy.

Hydraulic Jacks, Rams, and Pullers. A 12-page two-color bulletin (No. 53) published by Templeton, Kenly & Co., Gardner Rd., Broadview, Ill., describes and illustrates Simplex hydraulic jacks, rams, and pullers. Additional information for hydraulic equipment with capacities of from 10 to 100 tons is included in the bulletin.

Recirculating Heat-Treating Furnaces. A 12-page colorful bulletin (No. 81) issued by Despatch Oven Co., 619 S. E. 8th St., Minneapolis, Minn., fully describes and illustrates its recirculating heat-treating furnaces. Many designs of Despatch furnaces in operation on a variety of heat-treating applications are shown, and furnace performance records are provided in several instances. Detailed specifications for pot-type, batch, and conveyor-type furnaces are included in the bulletin.

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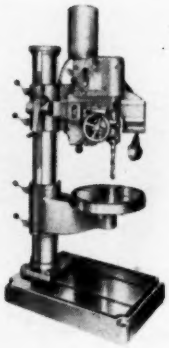

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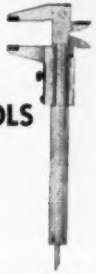

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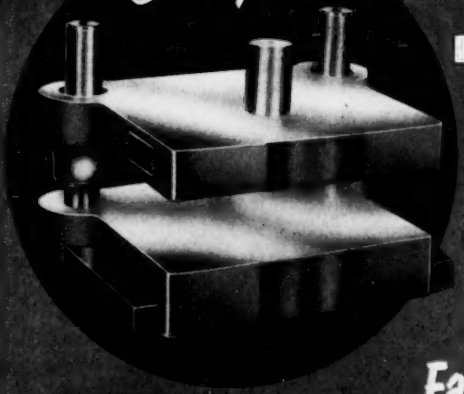

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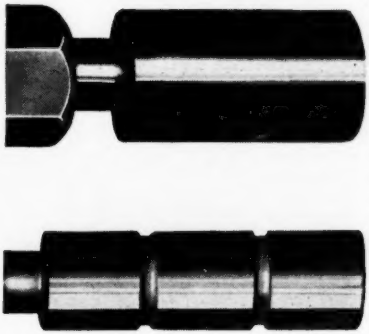

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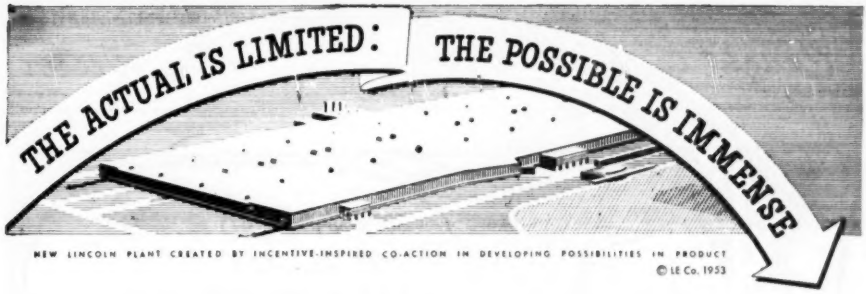

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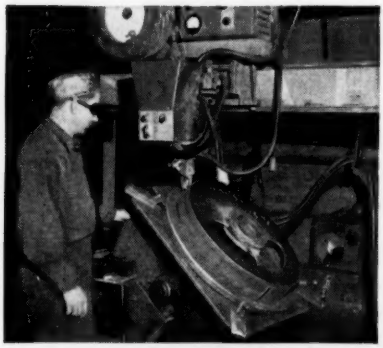

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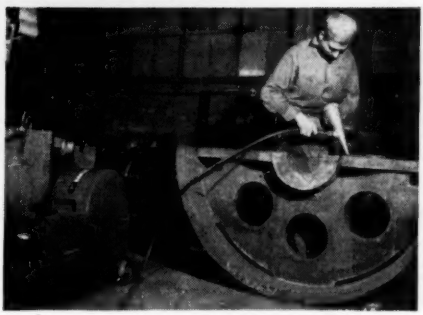

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SOON TO BE WALKED BUT DOESN'T KNOW IT
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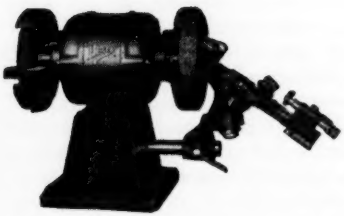

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the last word

The Newest Look

When shortly after World War II the suggestion was made to satisfy the demands for higher wages on the basis of increased production, the suggestion was either completely ignored, or labeled fantastic. It is interesting to note at this late date how times, as well as tactics, may change to fit the needs of the moment. We believe that the following report from the National City Bank, of New York, provides a clear exposition of the "theory of productivity."

"This year the unions' objectives and arguments again are being varied to suit the economic climate. The chief difference as compared with earlier postwar years is that the rise in living costs has leveled out, which undercuts that argument for wage increases. In fact, labor leaders envision the possibility that the "escalator" idea of tying wages to the cost of living index may not only be played out, but may even work in reverse. Hence they are now attempting to "freeze in" past gains, and to change escalation provisions in contracts so that the escalator will work only in an upward direction. At the same time they turn increasingly to alternative sources of wage and benefit increases. The recent United Auto Workers negotiations with the auto industry illustrate the point. These settlements put a floor under escalation losses by writing 19 cents of past hourly escalation gains into basic wages. They provided faster escalation of wages above than below present levels, increased annual productivity increments, and gave some additional pension benefits.

"With the living cost argument undercut, the unions are basing their claims for new wage and benefit increases mainly on (1) increased productivity, and (2) the need of providing additional purchasing power for the workers as defense spending falls off, in order to maintain prosperity.

"George Meany, president of the American Federation of Labor, sounded the opening gun of the 1953 labor campaign at a meeting of the A.F.L. Executive Council last February, when he said: "If wages fail to keep pace with productivity, workers will not have enough to buy goods, markets will collapse, factories will be closed, mass unemployment will follow, and a depression will result." The steel workers, in presenting their demands recently, echoed essentially the same theme.

"The productivity argument raises the question of principle in distributing the rewards of productivity. It has often been pointed out that the basis for higher wages must be increased productivity, for only by greater output per man-hour can more goods per capita be available to raise real incomes throughout the economy. But there are various ways in which productivity gains can be distributed. They should, as far as possible, go to everybody.

"Not only those who are factory workers contribute to the improved efficiency of our economy, but also school teachers, repairmen, farmers, public servants, those whose savings provide the necessary capital for new plant and equipment, and all who work at tasks for which there is an economic demand. Cutting the cake of productivity should result in improving the real income of all these persons, not just a few. This is best done by distributing some of the gains of productivity in the form of lower prices, to increase the buying power of all groups in the economy.

"Any theory that labor is entitled to a lion's share of productivity gains must also be balanced against the just claims of capital, which has provided the new tools and machinery that have lightened the burden of labor's toil and been largely responsible for its vastly increased output. The productivity of the American worker has been raised not because he works harder or longer or necessarily with more skill, but mainly because he has at his disposal a greatly enlarged and costly investment in equipment and power. The steel industry alone, from the end of the war through this year, will have expended over $5½ billion for increasing the capacity and efficiency of the country's steel plants. Are not the owners of these companies entitled to share in the return on this huge additional investment? Lacking such incentive, who would provide the tools for production and take the risks of enterprise without which progress would come to a halt?

"The second theory, that the way to maintain prosperity is to increase purchasing power by boosting wages, may sound plausible to many, yet anyone who has had to meet a payroll can spot the "catch" in a minute. He knows that increasing wages means, other things being equal, increasing costs, and that unless he can increase prices correspondingly he is in trouble. Profit margins shrink, and the incentive to expand and employ more people is discouraged, thus weakening a major support to business momentum.

"The theory may seem to work so long as increased costs can be passed on in prices. But this is at the expense of the consumer. Since not everyone can get an increase at the same time and in the same amount, and those whose incomes are inflexible get none, a great many people find their ability to buy actually reduced. A new round of wage increases in autos and steel, that sets a pattern for other highly organized industries, may temporarily put more dollars in pockets of a favored minority of American wage-earners, but if accompanied by increased prices, will mean depreciating the buying power of the dollars of all Americans.

"If enough people are unable or unwilling to buy because prices are too high, that also would lead to the accumulating surpluses of consumer goods, mass unemployment, and general depression that Mr. Meany talks about.

"Thus what the question finally comes down to is whether it is better to try to increase purchasing power by pushing higher the wages of the relatively few who by virtue of their strong hold in key industries are in a position to adopt aggressive tactics, but who by such tactics may find themselves priced out of the market; or whether it is better to hold the line on wages and allow the forces of increasing competition, the gains in productivity, and the decline in materials prices to be reflected in generally lower living costs which will be of benefit to all.

"In the first case, the risk is one of creating new distortions in the economy, with disruption of trade relations and loss of purchasing power when people can no longer do business with one another. In the second, such risks are minimized, and the basis more surely maintained for the balanced relations which are necessary if business is to enjoy broad markets and labor is to have full employment."

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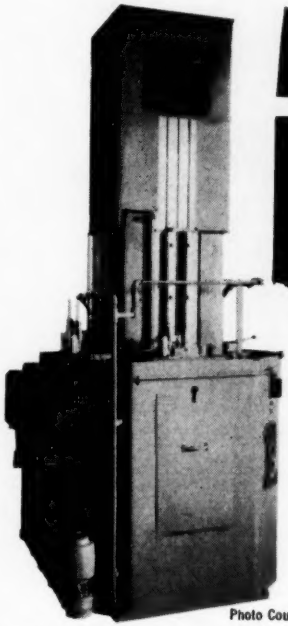

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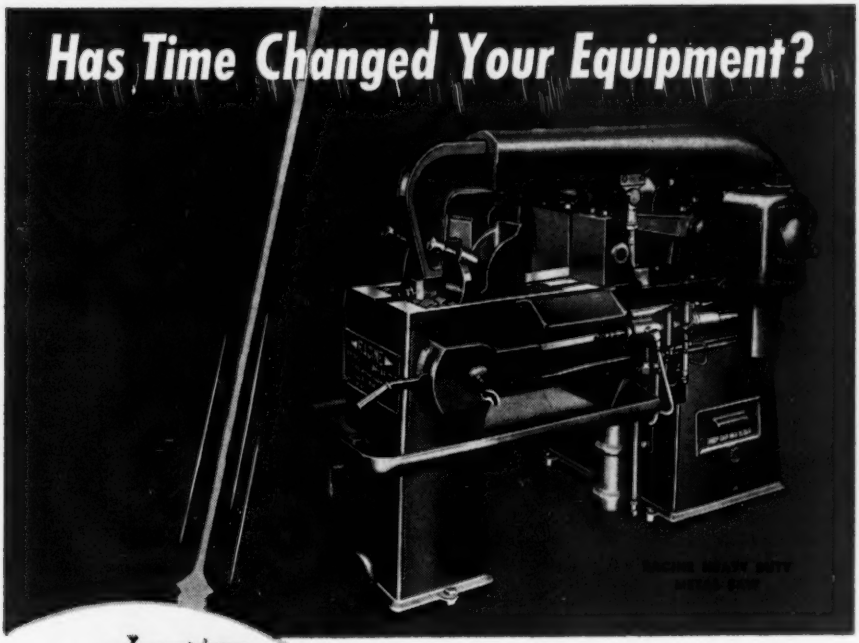

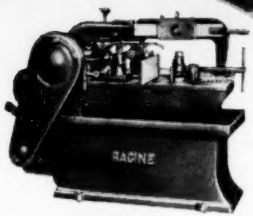

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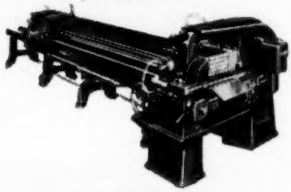

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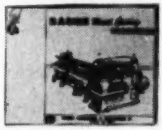

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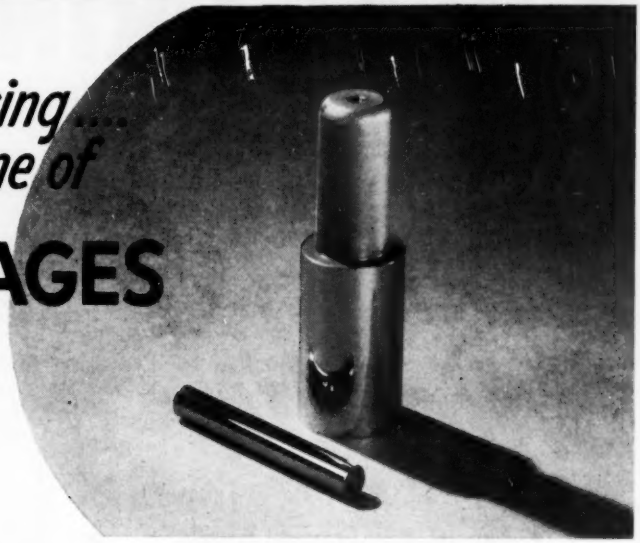

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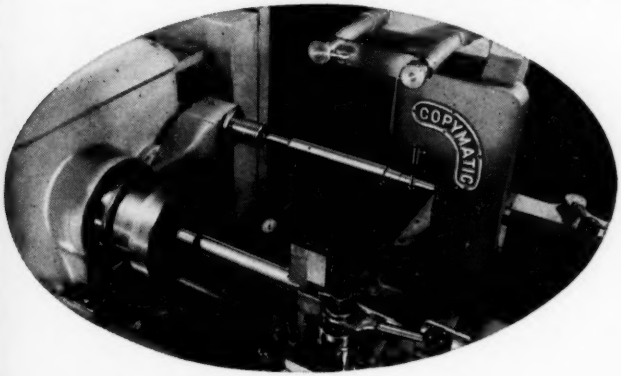

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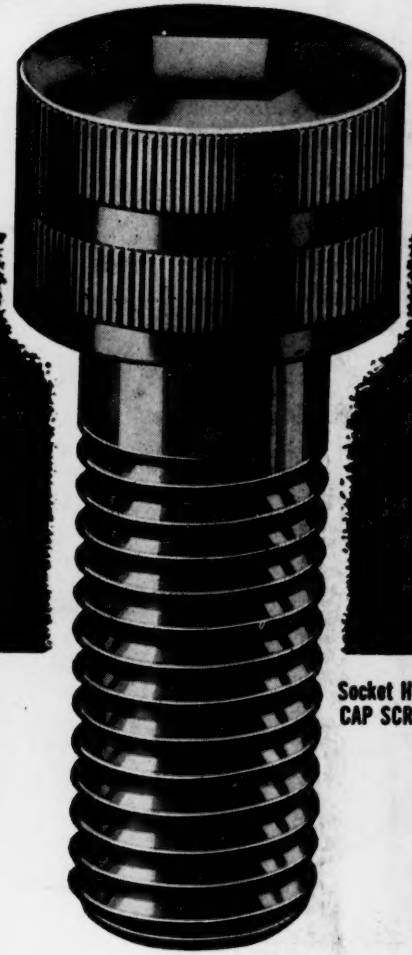

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